

Mamluks and Animals

Veterinary Medicine in Medieval Islam



BY

HOUSNI ALKHATEEB SHEHADA

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Housni Alkhateeb Shehada



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Kitāb al-Bayṭarah, Library of Istanbul University, Istanbul, AY. 4689, fol 51r^o (15th century).

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*This book is dedicated to the memory of my parents, Abd al-Kareem
Shehada and Mariam al-Khateeb-Shehada from Ascalon, who instilled in
me the love for animals and for learning.*

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ABBREVIATIONS

B.L.	British Library, London
B.N.	Bibliothèque Nationale, Paris
Bodl. L.	Bodleian Library, Oxford
Cam. U.L.	Cambridge University Library, Cambridge
<i>E.I.</i> ²	<i>The Encyclopaedia of Islam</i> , New Edition, eds. C.E. Bosworth et al., 1-12, Leiden: E.J. Brill, 1954-2005.
K.K.	Köprülü Kütüphanesi, Istanbul
<i>M.S.R.</i>	<i>Mamluk Studies Review</i>
S.K.	Süleymaniye Kütüphanesi, Istanbul
<i>Z.D.M.G.</i>	<i>Zeitschrift der Deutschen Morgenländischen Gesellschaft</i>
<i>W.Z.K.M</i>	<i>Wiener Zeitschrift für die Kunde des Morgenlandes</i>

Transliteration of Arabic

ALA-LC 1997^(5.0)

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Al-Şāhib Tāj al-Dīn, Abū ʿAbd Allāh Muḥammad Ibn Muḥammad Ibn ʿAlī (d. 707/1307), *Kitāb al-Bayṭarah*; Süleymaniye Library, Istanbul, Fatih, MS. 3609, fols. 73r° and 85v° (Egypt, 14th century?).
47. A horse suffering from colic
Kitāb al-zardaqaḥ fī maʿrifat al-khayl wa-ajnāsihā wa-amrāḍihā wa-adwiyatihā, Shah Brothers, London (18th century).
48. Treatment of a venereal horse disease
Kitāb al-Bayṭarah, Topkapi Palace Museum Library, TSMK A.2115, fol. 156v° (Bagdad, Seljuks period).

INTRODUCTION

A. A NEW APPROACH

The present book is the first historical study in some hundred years to deal extensively with the history of Islamic veterinary medicine in general, and that of the Mamluk period in particular. The approach of this study is also new: it deals not merely with the scientific aspects of veterinary medicine, but also with the social, political and cultural framework in which veterinarians, writers of veterinary treatises and other persons dealing in one way or another with animals were active in the wide geographical area controlled by the Mamluks between the mid-thirteenth and the early sixteenth century.

The Mamluk period offers an impressive quantity of veterinary treatises, most of them unpublished, as well as abundant sources of information casting light on social, economic and cultural aspects related to the development of the veterinary profession. This combination has permitted an examination of the development of veterinary medicine in its broad historical context. From the scientific aspect, this study attempts to examine the characteristics of veterinary knowledge as expressed in the Arabic treatises written or copied in the Mamluk period, the theoretical basis for the treatment of animals and the extent of its similarity to medical treatment of humans. Beyond the purely scientific sphere, the present study examines the place of animals in Mamluk society, the place of veterinary medicine in Mamluk culture, and the social status and identity of the doctor or healer who treated animals compared to professionals in related fields.

B. TERMINOLOGY

The use of the terms “veterinary medicine” and “veterinarians” in the contexts of the Mamluk period requires clarification of the relevant terminology found in Arabic classical sources. The verb *baṭara* (بَطَرَ), according to classical Arabic dictionaries, signifies to cut, dissect, or amputate.¹ The

¹ Ibn Manẓūr al-Ifriqī, “b-ṭ-r.,” *Lisān al-‘Arab*, Beirut: Dār Ṣādir, 1986, vol. IV, pp. 69-70.

derivative terms *bayṭār* or *mubayṭir*, used in pre-Islamic Arabic sources to describe a person engaged in the medical care of animals, as well as of human beings, are evidently derived from the same root.

In the works of the great *jāhilī* poets, known as “Aṣḥāb al-Mu‘allaqāt,” the word *mubayṭir* or *bayṭār* is used to denote a person who cures animals. Thus, in a description by the sixth-century poet al-Nābighah al-Dhubayānī (d. circa 604 CE) of a battle between a bull and a dog, the poet compares the wound inflicted on the dog by the bull’s horn piercing his shoulder to a cut made by a veterinary surgeon (*mubayṭir*) in a camel’s leg to cure it.² In the book *Kitāb al-Ḥayawān*, the eighth-century writer al-Jāḥiẓ quotes verses of a poem by Saḥm b. Ḥanzalah, in which a veterinary surgeon (*bayṭār*) appears as puncturing the navel, shaking the body or piercing a nerve.³ He himself also uses the term *bayṭarah* in the context of castration of animals, comparing it to the cutting of a sheep’s tail, which he refers to as a form of *bayṭarah*.⁴

The eighteenth-century dictionary by al-Zubaydī (d. 1790), which is a revised version of a fifteenth-century dictionary by al-Fayrūzābādī (d. 1415) (*al-Qāmūs al-Muḥīṭ*) includes, under the root *b.t.r.*, several sayings and proverbs dating from the *jāhilīyah* period. Thus one proverb goes: “Better-known than a veterinary surgeon’s (*bayṭār*) banner.” Another proverb containing the term *bayṭār* says: “the world is as unpredictable as a whore, one day you go to the pharmacist (‘aṭṭār) and another day you go to an animal doctor (*bayṭār*) (الدنيا قبة، يوما عند عطار، ويوما عند البيطار).”

Another saying refers to the veterinary surgeon (*mubayṭir*) who dominates people by healing their animals: فهو الان وعهدي به ولدوا بنا مُبَيِّطِر (علينا مُسَيِّطِر).⁵

In view of this evidence, one may wonder why the terms *bayṭār* and its derivations should be described as an Arabicised form of the Greek term *hippiatros* (ἵππιατρός) (horse doctor), as is commonly claimed in modern scholarship.⁶

² Ziyād b. M‘āwīyah b. Qabāb (known as al-Nābighah al-Dhubayānī), *Diwān al-Nābighah al-Dhubayānī*, ed. Karam al-Bustānī, Beirut: Dār Ṣādir lil-ṭibā‘ah wal-Nashr, 1963, p. 32:

["طعن المبيطِر إذ يشفى من العضد شلّ الفريضة بالمدرى فأفغذها"]

³ ‘Amrū b. Baḥr al-Jāḥiẓ, *Kitāb al-Ḥayawān*, ed. Fawzi ‘Aṭawī, Beirut: Dār Ṣa‘b, 1982 (7 vols. In 2 books), vol. I, p. 111.

⁴ *Ibid.*, p. 98.

⁵ Muḥibb al-Dīn Abī Fayḍ al-Sayyid Muḥammad Murtaḍā al-Zubaydī, “b-ṭ-r.,” *Taj al-‘arūs min jawāhir al-qāmūs*, ed. ‘Alī Shīrī, Beirut: Dār al-Fikr, 1994, vol. I, pp. 97-99.

⁶ M. Plessner, “Bayṭār,” *The Encyclopaedia of Islam, New Edition* [hereafter *E.I.*], eds. B. Lewis, Ch. Pellat and J. Schacht, Leiden and London: E.J. Brill and Luzac and Co., vol. I (1960), p. 1149; Ullmann, *Die Medizin im Islam*, Handbuch der Orientalistik, ed. Bertold Spuler, 1

In the Mamluk period, the term *bayṭār* was rather a comprehensive title for the professional who gave medical treatment to various sorts of animals.⁷ There were also separate names for professionals who looked after and treated specific animals; for example, *kalbadhah* means dealing with dogs, and *kallāb* (pl. *kalābidhah*) was the term for experts in the treatment and training of dogs. *Bayzarah* is falconry and hawking (taming, training and treating of hawks, falcons and other hunting birds), and *bāzyār* is the appellation for the expert on hawks and falcons.⁸ *Zardaqaḥ*, or *zarṭaqaḥ*, means dealing with horses, and from this word derived the word *muzardiḡ*, the specialist in treating and taming horses. The use of these terms is discussed in greater depth in other chapters of this book, referring to the different groups and their professional and social status.

While the two main branches discussed in veterinary treatises of the Mamluk period are *bayṭarah* and *bayzarah*, some of the writers of the Mamluk period chose to group these two branches together.⁹ Although not all scholars are convinced of this, in the Islamic world of the Middle Ages veterinary medicine was a scientific and professional sphere in its own right, which is manifested, among other things, by the scientific and professional literature devoted to it.¹⁰

Abt.: Der Nahe und der Mittlere Osten, Ergänzungsband VI, Erster Abschnitt, Leiden-Köln: E.J. Brill, 1970, pp. 217-218.

⁷ See Chapter II.

⁸ The current definition of *bayzarah* is "the science of medical treatment of hunting animals for the purpose of maintaining their state of good health, keeping away illness, and knowing the signs that indicate their strength and hunting skill" (علم يبحث فيه عن احوال الجوارح من حيث حفظ صحتها وإزالة مرضها ومعرفة العلامات الدالة على قوتها في الصيد ووضعها فيه). See Muṣṭafā b. 'Abd Allā Ḥājī Khalīfah (d. 1657), *Kitāb kashf al-zunūn 'an asāmī al-kutub wa-al-funūn*, eds. Muḥammad Sharaf al-Dīn Bālnaqāyā wa-Rif'at Bilkah al-Kalīsī, Istanbul: Wakālat al-Ma'ārif, 1941, vol. I, p. 256 [Tehran, 1974].

⁹ See, for example, The Bodleian Library, Oxford, *Ms. Arab d. 208*.

¹⁰ For more skeptical views concerning the independent status of this field, see Fuat Sezgin, *Geschichte des arabischen Schrifttums, Band III: Medizin—Pharmazie—Zoologie—Tierheilkunde. Bis ca 430 H.*, Leiden: E.J. Brill, 1970; Herbert Eisenstein, "Las obras árabes de medicina veterinaria: ¿tratados médicos o literatura edificante?," *Actas XVI Congreso UEAI, Salamanca: Agencia Española de Cooperación Internacional Consejo Superior de Investigaciones Científicas, Union Européenne d'Arabisants et d'Islamisants*, 1995, pp. 157-163.

C. HISTORIOGRAPHY

1. *Publication of Sources*

Interest in Islamic veterinary medicine started to develop in the modern academic milieu already at the beginning of the nineteenth century. The earliest work in this field was Josef Antonio Banqueri's Spanish translation of the book on agriculture, *Kitāb al-Filāḥah*, by the twelfth-century Ibn al-'Awwām al-Ishbīlī, consisting of two large volumes with the Arabic text facing the Spanish.¹¹ Although most of this treatise deals with enriching soil and agricultural crops, it also contains abundant veterinary material, including a description of animals' diseases and ways of treating them. The veterinary material, dealing with almost all the farm animals of the Middle Ages, constitutes some third of the treatise.

A most important and comprehensive translation project was that of Nicolas Perron, who between the years 1852 and 1860 published three volumes containing French translations of medieval Arabic treatises under the title "Le Naceri".¹² The first volume, comprising 500 pages, presents an extensive account of the historical, geographical and social background of the Mamluk period in Egypt, and it also includes a comprehensive discussion of the Arabian horse and the various breeds that evolved from it in different places. The other two volumes contain the French translation of the fourteenth-century Arabic treatise, whose title appears in different versions: *Kāshif hamm al-wayl fī akhbār al-khayl*, or *Kāmil al-ṣinā'atayn fil-bayṭarah wal-zarṭaqah*, known as *al-Nāṣirī*. Perron added to the translated text numerous explanations and abundant information that was not drawn from the original Arabic source. Apparently he began this work as a translation but soon deviated from his main purpose, including everything relating to horses that he could find in Arabic writings. In the end he pub-

¹¹ Josef Antonio Banqueri (traducido al castellano y antado), *Libro de Agricultura su autor El doctor excelente Abu Zacaria Iahia Aben Mohamed Ben Ahmed Ebn el Awam, Sevillano*, Madrid: La Imprenta Real, 1802 [reprinted in Madrid: Ministerio de Agricultura, Pesca y Alimentacion, 1988]. For a recent revised edition, see Ibn al-'Awwām, *Le Livre de l'agriculture, Kitāb al-Filāḥa, traduction de l'arabe de J.J. Clément-Mullet, revue et corrigée, introduction de Mohammed El Faïz*, Paris: Sindbad, 2000.

¹² Nicolas Perron, *Le Naceri. La perfection des deux arts, ou Traité complet d'hippologie et d'hippiatrie arabes*, Traduit de l'Arabe d'Abou Bekr ibn Bedr, Deuxième partie, seconde devision, Hippiatrie (III), Paris: Vve Bouchard-Huzard, 1852-1860.

lished three volumes containing extensive material on horses, their training, their illnesses and treatment.¹³

An exceptional event in the modern historiography of Arabic writings on animals was the publication in Aleppo, in 1930, of the fourteenth-century book on animals by al-Dimyāṭī, together with a seventeenth-century book on horses.¹⁴ In 1954, Muhammad Asad Talas published an edition of a treatise on hunting by the tenth-century writer Kushājīm,¹⁵ a treatise largely used by later medieval writers on falconry. These two editions do not testify to any significant interest in medieval veterinary medicine, but were rather part of a wider interest in *adab* or in religious topics.

The person largely responsible for the revival of interest in medieval Arabic treatises related to veterinary medicine is undoubtedly François Viré, through his studies of Arabic falconry treatises that also include sections on the medical treatment of birds of prey used for hunting. The first treatise that he fully published in French translation in 1967 was the tenth-century manual composed by the falconer of the Fatimid Caliph al-'Azīz billāh.¹⁶ Abd al-Ḥafīẓ Maṣṣūr published in 1968 the two chapters of a hunting treatise, written under the patronage of the Ḥafṣī calif al-Mustaṣṣir billāh, known as al-Manṣūr (1249-1277). These chapters, preserved in two

¹³ Lucien Leclerc (1876), in the second volume of his comprehensive work on the history of Arab medicine, expresses admiration for Perron's work, particularly for his first volume, which supplies a wealth of information on the Mamluk period, but he also regrets that in the other two volumes Perron used inferior Arabic sources and also translated from many other sources without mentioning the writers' names, so that the amount of secondary material exceeded the *al-Nāṣirī* source. Reinhard Froehner criticised Perron for not consulting an expert on Arabic to avoid many mistakes in the translation. See Lucien Leclerc, *Histoire de la médecine arabe*, Paris, 1876; Reinhard Froehner, "Das Nacerische Buch des Abu Bekr ibn Bedr, Beitrag zur Kenntnis der mittelalterlichen orientalischen Vetrinärmedizin," *Archiv für wissenschaftliche und praktische Tierheilkunde*, LX (1929), pp. 362-375.

¹⁴ Sharaf al-Dīn 'Abd al-Mu'min al-Dimyāṭī al-Miṣrī (d. 705/1305), *Faḍl al-khayl*, ed. Muḥammad Rāghib al-Ṭabbākh, Aleppo: al-Maṭba'ah al-'Ilmiyah, 1930. In the same volume: Muḥammad al-Bakhshī al-Ḥalabī, *Rashaḥāt al-madād fīmā yata'allaq bi-al-ṣāfināt al-jiyād*, Aleppo: al-Maṭba'ah al-'Ilmiyah, 1930.

¹⁵ Maḥmūd b. al-Ḥasan al-Kātib known as Kushājīm, *al-Maṣā'id wa-al-maṭārid*, ed. Muḥammad As'ad Ṭalas, Baghdad: Dār al-Ma'rifah, 1954. Möller noted that this edition is "unusable by philologists." See Detlef Möller, *Studien zur mittelalterlichen arabischen Falknereliteratur*, Quellen und Studien zur Geschichte der Jagd, Bd. X, Berlin, 1965, p. 9.

¹⁶ *Le traité de l'art de volerie (Kitab al-bayzara), rédigé vers 385/955 par le Grand-Fouconnier du calife fatimide al-'Aziz bi-llah*, ed. and trans. by François Viré, Leiden: Brill, 1967 (originally published in *Arabica*, vol. XII (1966), pp. 1-296 and vol. XIII (1966), pp. 39-84). Viré's earliest publication on hunting in medieval Arabic sources included an excerpt from Averroes' legal treatise that deals with religious aspects of hunting. See François Viré, "Le livre de la chasse (Averroès), extrait de la Bidāyat al-mujtahid. Texte et traduction annotée par F. Viré," *Revue Tunisienne de Droit*, vol. II (1954), pp. 231-251.

manuscripts in the Ḥafṣī Library of Tunis, deal with dogs, cheetahs and a few other hunting animals (not birds), and with their prey. The author, generally referred to as al-Manṣūrī, was identified by the editor as Muḥammad Ibn al-Ḥashshā'. An English translation of these chapters was later published by Sir Terence Clark and Muawiya Derhalli.¹⁷

Some twenty years later, Viré published a translation of the fourteenth-century falconry treatise by Ibn Manglī.¹⁸ Finally, in collaboration with Detlef Möller, he prepared a reconstruction, in German translation, of the falconry treatise attributed to al-Ghaṭrīf, considered to be the earliest Arabic book in this field, dating back to the eighth century.¹⁹ Not a few manuscripts attributed to al-Ghaṭrīf (or al-Ghiṭrīf) have survived in European languages, and many references to the same author's *Kitāb dawārī al-ṭayr* can also be found in later Arabic writings on falconry. Möller and Viré used these materials for a reconstruction of what they believed had constituted the original Arabic text.²⁰ The basic assumption behind this work is that the recurrent references in later treatises to al-Ghiṭrīf and other presumed authors represent real figures, who lived and acted during the Umayyad and Abbasid periods. Although such an assumption cannot be excluded altogether, it can also be put into doubt, considering the habit of medieval Arabic writers to attribute various sayings to authoritative figures, be they real or imaginary.

An impressive number of printed editions of medieval Arabic treatises on veterinary medicine or related to this subject began to appear in the 1980s, mostly in the Arab world. The falconry book, *al-Kāfi fī al-bayzarah*, by the thirteenth-century 'Abd al-Raḥmān al-Baladī, was published in 1983, edited by the two scholars Iḥsān 'Abbās and 'Abd al-Ḥafīz Manṣūr.²¹ Fuat

¹⁷ Aḥmad al-Ḥashshā' (attributed to) *al-Manṣūrī fī al-bayzarah*, ed. 'Abd al-Ḥafīz Manṣūr, published at "Majallat al-Mashriq, vol. II (Mars-April, 1968, year 62). Re-published as *al-Manṣūrī fī al-bayzarah*, Tunis, 1989; *Al-Mansur's Book on Hunting*, eds. and trans. Sir Terence Clark and Muawiya Derhalli, Warminster, England: Aris & Philips Ltd, 2001.

¹⁸ Ibn Manglī, *De la chasse. Commerce des grands de ce monde avec les bêtes sauvages des déserts sans onde*, ed. and trans. by François Viré, Paris: Sindbad, 1984.

¹⁹ Detlef Möller and François Viré, *Al-Gitrif ibn Qudama al-Ghassani, Die Beizvögel (Kitāb dawārī al-ṭayr)*, Ein arabisches Falknereibuch des 8. Jahrhunderts, Deutsche Übersetzung, Hildesheim-Zurich-New York, 1988.

²⁰ For a Franco-Italian version of a falconry treatise attributed to Ghatrīf, see Håkan Tjerneld, *Moamin et Ghatrīf: Traités de Fauconnerie et des chiens de chasse*, Édition princeps de la version Franco-italienne (Thèse pour le Doctorat), Stockholm—Paris, Editions C.E. Fritze and Librairie J. Thiébaud, 1945.

²¹ 'Abd al-Raḥmān b. Muḥammad al-Baladī, *Kitāb al-Kāfi fī al-bayzarah*, eds. Iḥsān 'Abbās and 'Abd al-Ḥafīz Manṣūr, Beirut: al-Mu'assasah al- 'Arabiyyah li-al-Dirāsāt wa-al-Nashr, 1983 [hereafter: al-Baladī, *al-Kāfi fī al-bayzarah*].

Sezgin published in 1984 a two-volume facsimile edition of the manuscript of the important veterinary book, *Kitāb al-bayṭarah* by the vizier al-Šāḥib Tāj al-Dīn (d. 707/1307).²² Two years later, the same scholar published a facsimile edition of a fifteenth-century falconry treatise, entitled *Kitāb Ḍawārī al-ṭayr*, and attributed to al-Ghaṭrīf.²³ In 1987, Yahyā Wahīb al-Jabūrī of Qatar University published the veterinary treatise, *al-Aqwāl al-kāfiyah wa-al-fuṣūl al-shāfiyah*, written by a Yemenite ruler of the Rasūlid dynasty, al-Malik al-Mujāhid ‘Alī b. Dāuūd b. Yūsuf b. ‘Umar (1306-1362).²⁴ One year later Muḥammad Kurd ‘Alī published the falconry treatise written for the Faṭimid caliph al-‘Azīz billāh (previously published in French by Viré), and attributed to Abī ‘Abd Allāh al-Ḥasan b. al-Ḥusayn.²⁵ Ramzīyah Muḥammad al-Aṭraqjī, a researcher at Baghdad University, published in 1989 the veterinary treatise of another Yemenite king—al-Malik al-Ashraf ‘Umar b. Yūsuf al-Ghassānī (d. 696/1296).²⁶ Particularly worthy of mention is Abū Bakr al-Bayṭār’s *Kāshif hamm al-wayl fi akhbār al-khayl*, which was published in two volumes between 1991 and 1996 with a French translation by ‘Abd al-Raḥmān al-Daqqāq, who is a professional veterinary surgeon.²⁷ The same treatise was published only in Arabic by ‘Abd al-Raḥmān Ibrīq at the University of Aleppo in 1993.²⁸ This year was particularly fruitful in this field: it saw the publication of another fourteenth-century manuscript (757/1356), written by an anonymous author and edited by Muḥammad

²² Abū ‘Abd Allāh Muḥammad Ibn Muḥammad Ibn ‘Alī al-Šāḥib Tāj al-Dīn (d. 707/1307), *Kitāb al-Baytarah, Book on Veterinary Medicine*, reproduced from MSS 3698, 3609 *Fatih Collection*, Sülemaniye Library, Istanbul, ed. Fuat Sezgin, Frankfurt am Main: Institute for the History of Arabic-Islamic Science at the Johan Wolfgang Goethe University, Series C—Facsimile Editions, vols. V/1-2, 1984.

²³ Al-Ghaṭrīf ibn Qudāma al-Ghassānī (Eighth century AD), *The Book on Birds of Prey—Kitāb Ḍawārī al-ṭayr*, Facsimile Editions, ed. Fuat Sezgin, Reproduced from MS *Aḥmad III No. 2099*, Topkapı Saray Library, Istanbul, Frankfurt am Main: Publications of the Institute for the History of Arabic-Islamic Science at the Johann Wolfgang Goethe University, Series C—Facsimile Editions, vol. XXV, 1986.

²⁴ Al-Malik al-Mujāhid ‘Alī b. Dā’ūd b. Yūsuf al-Rasūlī (d. 764/1362), *al-Aqwāl al-kāfiyah wa-al-fuṣūl al-shāfiyah fi al-khayl*, ed. Yahyā Jabūrī, Beirut: Dār al-Gharb al-Islāmī, 1987.

²⁵ Abū ‘Abd Allāh al-Ḥasan b. al-Ḥusayn (attributed to), Bāzyār al-‘Azīz billāh al-Fātimī, *al-Bayzarah*, ed. Maḥmūd Kurd ‘Alī, Damascus: Maṭbū‘āt Majma’ al-Lughah al-‘Arabīyah, 1409/1988. For some critical remarks on this edition, see Möller, *Studien*, pp. 9, 74.

²⁶ Al-Malik al-Ashraf ‘Umar b. Yūsuf al-Ghassānī (d. 696/1296), *al-Mughnī fi al-bayṭarah*, ed. Ramzīyah Muḥammad al-Aṭraqjī, Baghdad: Markaz Ihya’ al-Turāth al-‘Ilmī al-‘Arabī, 1989.

²⁷ Abū Bakr b. Badr al-Dīn al-Bayṭār, *Kāshif hamm al-wayl fi ma’rifat amrāḍ al-khayl, aw kāmīl al-ṣinā’atayn al-bayṭarah wa-al-zarṭaqah al-ma’rūf bi-al-Naṣīrī*, ed. ‘Abd al-Raḥmān al-Daqqāq, Beirut: Dār al-Nafā’is, 1991-1996.

²⁸ Abū Bakr al-Bayṭār, *Kāmīl al-ṣinā’atayn fi al-bayṭarah wa-al-zarḍaqah al-ma’rūf bi-al-Naṣīrī*, ed. ‘Abd al-Raḥmān Ibrīq, Aleppo: Ma’had al-Turāth al-‘Ilmī al-‘Arabī, 1413/1993.

al-Tūnājī, and that of *Uns al-malā bi-waḥsh al-falā*, by Muḥammad Ibn Mankalī or Manklī (who fought in the service of the Mamluks in fourteenth-century Egypt), which was published in the same year by Muḥammad ʿIsā Ṣāliḥīyah.²⁹ In 2000, the treatise on hunting by al-Nāshirī (1430-1520) was published by Abd Allāh Ḥusayn al-Sādah.³⁰

Two important translations from Arabic into western languages, carried out in the thirteenth century in two different centres, have served scholars in trying to reconstruct the sources underlying these works as well as the genealogy of early Arabic falconry treatises. The work attributed to Moamin, translated into Latin (c. 1240) in the Sicilian court of Emperor Frederic II, is believed to be a compilation of two main Arabic treatises: that of the above-mentioned al-Ghaṭrīf, and another one (now lost, at least in its full, original version) whose author is referred-to as al-Mutawakkilī, since he is said to have been the falconer of the Abbassid Caliph al-Mutawakkil (847-861).³¹ Al-Mutawakkilī's work has been identified as the source of the translation from Arabic into Castilian, carried out in 1250 in the court of Alfonso X. On the basis of this translation, the name of al-Mutawakkil's falconer has been identified as Muhammad Ibn ʿAbd Allāh ibn ʿUmar al-Bazyār.³²

The identity of this author, as well as the contents of his work have also been the subject of a study by Anna Akasoy and Stefan Georges, who have considered, besides the Latin and Castilian translations, the few Arabic texts that seem to contain parts of the same treatise, authored by Muḥammad Ibn ʿAbd Allāh ibn ʿUmar al-Bazyār, particularly the one preserved at the Gotha Library, entitled *Kitāb al-Ṣayd* (Gotha Ms. 2092, I), which does not mention the author's name. The above-mentioned chapters on hunting animals and their prey, attributed to al-Manṣūrī, have been

²⁹ Anonymous, *al-Jawād al-ʿarabī fi al-furūsīyah wa-tarbiyat al-khayl wa-bayʿatirihā*, ed. Muḥammad al-Tūnājī, Kuwait: Manshūrāt Markaz al-Makhtūṭāt wa-al-Turāth wa-al-Wathāʾiq, 1993; Muḥammad ibn Mankalī, *Uns al-malā bi-waḥsh al-falā*, ed. Muḥammad ʿIsā Ṣāliḥīyah, Amman-Beirut: Dār al-Bashīr and Muʾassasat al-Risālah, 1993.

³⁰ Ḥamzah b. ʿAbd Allāh b. Muḥammad al-Zubaydī al-Nāshirī (833-926/1430-1520), *Kitāb Intihāz al-furaṣ fi al-ṣayd wa-al-qanṣ*, ed. ʿAbd Allāh Ḥusayn al-Sāda, Damascus: Dār Kinān, 2000.

³¹ Möller, *Studien*, pp. 118-120; Anna Akasoy "The Influence of Arabic Tradition of Falconry and Hunting on Western Europe," *Islamic Crosspollinations: Interactions in the Medieval Middle East*, eds.: Anna Akasoy, James E. Montgomery and Peter E. Pormann, Exter: Gibb Memorial Trust, 2007, pp. 54-56.

³² Muḥammad ibn ʿAbd Allāh ibn ʿUmar al-Bāzyār, *Libro de los Animales que cazan* (*Kitāb al-ʿYawāriḥ*), ed. J.M. Fradejas Rueda, Madrid: Editorial Casariego, 1987; Akasoy, "The Influence," pp. 56-57.

identified by Akasoy and Geogres as belonging to the same work. Their study also contains the publication and German translation of chapter six of *Kitāb al-Ṣayd*, dedicated to the treatment of falcons' illnesses.³³

2. *Islamic Veterinary Medicine in the General Historiography of the Profession*

From the late nineteenth century, the general history of veterinary medicine has been the subject of various publications. Between 1891 and 1911, Leon Moulé, a veterinary surgeon, published a series of articles on veterinary history from ancient to modern times.³⁴ In the second article, which also came out as a separate publication, he deals with the veterinary history of the Middle Ages, dedicating a considerable part to the history of Arab veterinary medicine, including a comparison between Islamic and Classical veterinary medicine, based on his expertise in this field.³⁵ Not being proficient in Arabic, he had to rely on the few existing translations of Arabic veterinary books that were available in his time, as well as information gleaned from library catalogues. Impressed by the existence of many Arabic treatises on hippology and hippiatry, Moulé suggests that the innovations and developments that took place in almost every branch of science in the Islamic world did not pass over veterinary science. He cites the Arabs' love of horses as their motive for developing hippiatry and their reason for devoting so much attention not just to raising and breeding horses but also to their ailments and their cure. A useful section of this work is a systematic comparison between the Arab and the Greco-Roman

³³ Muḥammad ibn 'Abd Allāh al-Bāzyār, *Das Falken- und Hundebuch des Kalifen al-Mutawakkil. Ein arabischer Traktat aus dem 9. Jahrhundert*, Anna Akasoy and Stefan Georges (eds. & trans.), *Wissenskultur und gesellschaftlicher Wandel*, 11; Berlin: Akademie Verlag, 2005. On the *Kitāb al-Ṣayd* manuscript, see Möller, *Studien*, pp. 77-79.

³⁴ Leon Moulé, *Histoire de la médecine vétérinaire ... Première période: Histoire de la médecine vétérinaire dans l'Antiquité*, Paris: Imprimerie Maulde, Doumenc et C^{ie}, 1891 [extrait du *Bulletin de la Société Centrale de Médecine Vétérinaire*]; L. Moulé, *Histoire de la médecine vétérinaire ... Deuxième période: Histoire de la médecine vétérinaire au Moyen Age (476 à 1500). Deuxième partie: la médecine vétérinaire en Europe*, Paris: Imprimerie Maulde, Doumenc et C^{ie}, 1900 [extrait du *Bulletin de la Société Centrale de Médecine Vétérinaire*]; L. Moulé, *Histoire de la médecine vétérinaire ... Troisième période: Histoire de la médecine vétérinaire dans les temps modernes. Premier fascicule. La médecine vétérinaire au seizième siècle*, Paris: Imprimerie Maulde, Doumenc et C^{ie}, 1911 [extrait du *Bulletin de la Société Centrale de Médecine Vétérinaire*].

³⁵ Leon Moulé, *Histoire de la médecine vétérinaire ... Deuxième période: Histoire de la médecine vétérinaire au Moyen Age (476 à 1500). Première partie: la médecine vétérinaire arabe*, Paris: Imprimerie Maulde, Doumenc et C^{ie}, 1896 [extrait du *Bulletin de la Société Centrale de Médecine Vétérinaire*].

veterinary medicine from all the professional aspects: the digestive system, diseases of the urinary tract, the respiratory system, the circulatory system, venereal diseases, external pathology such as injury to the legs, illnesses and wounds of the spinal column, diseases of the ears and eyes, and infectious diseases. Moulé notes that, although the camel featured as the subject of a separate pathology in Arabic treatises, the description of illnesses, symptoms and methods of treatment fell far below the level that characterised the treatment of horses. Since none of the existing treatises dealing with pathology and illnesses of birds had been translated in his day, he was unable to make a comparison with this subject.

Other useful parts of this work are a list of medieval Arabic treatises of veterinary medicine and agriculture, including their locations and ascribed dates, accompanied by descriptions of their contents; a discussion of pathology, with a systematic list of diseases according to the bodily organs as they are described in the Arabic veterinary treatises; an analysis of surgery, listing the instruments that were used (with illustrations of some of them) and describing the various operations performed; a description of methods of treatment with lists of medications, classified according to their source in nature— animal, mineral, or plant sources; and a discussion of shoeing.

Moulé concludes that while the Arabs had not advanced significantly in surgery, this was not the case with other methods of treatment. He notes that real progress was made by the Arabs in the preparation of potions, particularly by simplifying the composition of medications and introducing substances such as sugar, syrups, purifying agents and plant extracts. In his view, the Arabs' contribution was also significant in the matter of hygiene in raising animals.

Despite the advantages of such a systematic presentation by a professional veterinarian, Moulé's work suffers from his unfamiliarity with Arabic culture, and particularly with the classical Arabic writing style. Thus, noting that descriptions of diseases in *al-Nāṣirī* often end with sentences such as: "He was cured by the will of God," "Sickness and remedy are In God's hands," "By God's grace," "God is the healer," he writes that despite their faith in the veterinary surgeon, the Arabs' fatalism dominated over any kind of knowledge, for they often preferred to rely on God's help rather than on the veterinarian's cure.³⁶

³⁶ *Ibid.*, p. 10.

Emmanuel Leclainche's research on the history of veterinary medicine includes a short chapter on Arab veterinary medicine.³⁷ He bases himself mainly on Moulé's work, focusing on several treatises pertaining to the treatment of horses, arguing, however, that there was no significant difference between Arab and Greek veterinary medicine, except in the fields of medications and certain surgical procedures.

Unlike nearly all authors mentioned in this section, Manfred Ullmann, the authoritative historian of Islamic medicine, was a professional orientalist. The short section that he dedicated to Islamic veterinary medicine in his general historical survey, described by him as a bibliographical work of reference, is therefore of special interest. It describes succinctly Arabic writings on veterinary medicine from earliest times to the sixteenth century, including both extant works (for which he provides short descriptions) and others that are only mentioned in other sources. References to writings on other topics that include sections on animal illnesses are also listed in this short but useful chapter.³⁸

Several recent surveys of the history of veterinary medicine ignore the richness of materials related to this field in medieval Arabic sources. This omission is in startling contrast to the importance ascribed to human medicine in the Muslim world, which the scholars see as a link in the chain between the classical Greek and Roman knowledge and that of medieval Europe. For example, R.E. Walker, when comparing veterinary with human medicine in the West, refers to the classical Greek sources and does not ignore the early Egyptian medicine, but he skips from the early centuries of the Common Era and the School of Alexandria to the twelfth and thirteenth centuries in the West, totally ignoring the Islamic contribution.³⁹ Lise Wilkinson, in her book on animals and their illnesses, ignores Islamic veterinary medicine in spite of her comprehensive treatment of the history of this field from the dawn of history in broad geographical areas.⁴⁰

³⁷ Emmanuel Leclainche, *Histoire de la médecine vétérinaire*, Toulouse: Office du Livre, 1936.

³⁸ Manfred Ullmann, *Die Medizin im Islam*, Handbuch der Orientalistik, ed. Bertold Spuler, 1 Abt.: Der Nahe und der Mittlere Osten, Ergänzungsband VI, Erster Abschnitt, Leiden-Köln: E.J. Brill, 1970, pp. 217-222. This book should not be confused with the same author's *Islamic Medicine*, which is not a translation of the former, and does not treat veterinary medicine at all. Cf. Manfred Ullmann, *Islamic Medicine*, Islamic Surveys II, Edinburgh: Edinburgh University Press, 1978.

³⁹ R.E. Walker, *Ars Veterinaria: The Veterinary Art from Antiquity to the End of the XIXth Century: Historical Essay*, New Jersey: Schering-Plough Animal Health, 1991.

⁴⁰ Lise Wilkinson, *Animals and Disease: An Introduction to the History of Comparative Medicine*, Cambridge: Cambridge University Press, 1992.

Dunlop and Williams' book on the history of veterinary medicine does include a short chapter devoted to Islamic veterinary medicine. Yet most of the references they provide are irrelevant to the subject, including an extensive discussion on sciences in Islam and on human medicine, as well as biographies of important doctors and scientists, such as al-Kindī, al-Rāzī, al-Majūsī, Ibn Sīnā, al-Zahrāwī, Ibn Rushd, Ibn Zuhīr, Maimonides, Ibn Khaldūn and Ibn Baṭṭūṭah, none of whom ever wrote a treatise on veterinary medicine. They mention very briefly some Arabic veterinary sources such as those of Ibn al-ʿAwwām and Abū Bakr Badr al-Dīn al-Bayṭār, but these are mentioned alongside the treatises of al-Jāḥiẓ and al-Damīrī, who were, in fact *adab* authors whose writings include rich zoological material. All that does not prevent them from concluding that the Arabs' major contribution to veterinary medicine was in the treatment of the organs of movement, surgery to heal wounds, ophthalmic medicine and the development of a broad range of medications from natural products. With regard to the latter, they remark that Islamic veterinary medicine expanded significantly previous knowledge based on Dioscorides.⁴¹

Most of the above-mentioned studies have been written by veterinary doctors who took an interest in the history of their profession. Scholarly works of this kind, though benefiting from the professional insights of their authors, suffer from two basic handicaps. First, being unfamiliar with Islamic cultural history and unable to read Arabic, they had to rely on the few translations into European languages that existed in their time, which were not always very reliable. Secondly, they were basically interested in the scientific development and in what they believed to be a process of transmission of medical knowledge from the Classical world, through medieval Islam, to the West. They were not particularly interested in the social, cultural, and even political aspects in which veterinary surgeons functioned in the Islamic world.

3. *Studies Focused on Medieval Arabic Veterinary Medicine and Other Related Subjects*

Among the early works on Arab veterinary medicine, mention should be made of the book (partly published in Arabic as a series of articles) by Habib K. Chiha, who documented the knowledge transmitted by word of mouth among the Bedouins in Mesopotamia. He recorded in writing

⁴¹ Robert H. Dunlop, and David J., William, *Veterinary Medicine: An Illustrated History*, St. Louis: Mosby, 1995, pp. 187-197.

everything he heard and saw among the Bedouin tribes concerning veterinary medicine. This work focuses only on matters relevant to the treatment of horses, enumerating eight types of diseases that affect these animals, their symptoms and their treatment, including the preparation and use medications made from familiar and accessible materials.⁴² It is, of course, questionable to what extent this knowledge, garnered among Bedouins at the end of the nineteenth century, is a continuation of the veterinary knowledge possessed by the Arabs in the Middle Ages. A comparison of this material with the treatises that are the focus of this book may provide an answer to this question.

Worthy of notice is also a series of short articles published in 1907 by D.C. Phillott and R.F. Azoo in the *Journal of the Asiatic Society of Bengal*. In these studies the two scholars presented gleanings from a late fourteenth-century manuscript dedicated to falconry, which also includes medical aspects of keeping birds of prey.⁴³

It took several decades before an expert in Greek philology, Gudmund Björck, dedicated a study to our subject, examining the originality of the Arabic veterinary treatises by comparing them with ancient Greek ones. He discussed the ways in which Greek veterinary knowledge was transmitted to Arabic, attempting to identify passages from the *Corpus hippiatricorum Graecorum* in Ibn al-ʿAwwām's book on agriculture.⁴⁴

⁴² Part of this work was published in 1898 in an Arabic translation in the journal *Al-Mashriq* (vols. XV and XX). See al-Ab Anastās al-Karmilī, "al-Bayṭarah ʿind al-ʿArab li-Ḥabīb Afandī Shihā, *Majalat al-Mashriq*, Beirut, vol. XV (1898), pp. 684-686, and vol. XX (1899), pp. 943-946; see Habib K. Chiha, *La province de Bagdad: son passé, son présent, son avenir: contenant aussi des notes sur le chemin de fer de Bagdad et une étude inédite sur les tribus nomades de la Mésopotamie*, Le Caire: Imprimerie el-Maaref, 1908.

⁴³ D.C. Phillott and R.F. Azoo, "On Hunting Dogs, Being an Extract from the *Kitāb* 'l-Jamharah fi 'ilm' l-Bazarah [sic]," *Journal and Proceedings of the Asiatic Society of Bengal* (N.S.), III/9 (1907), pp. 599-600; D.C. Phillott (Lieut.-Colonel) and R.F. Azoo, "Some Birds and other Animals that Have Been Metamorphosed [Being an extract from the *Kitāb* 'l-Jamharah fi 'ilm' l-Bazarah, an Arabic manuscript, no. 865, in the Library of Asiatic Society of Bengal]," *Journal and Proceedings of the Asiatic Society of Bengal* (N.S.), III/9 (1907), pp. 139-143; D.C. Phillott (Lieut.-Colonel) and R.F. Azoo, "The Birds' Complaint before Solomon: Being an Extract with a Translation from the *Kitāb* 'l-Jamharah fi 'ilm' l-Bazarah," *Journal and Proceedings of the Asiatic Society of Bengal* (N.S.), III, 3 (1907), pp. 173-178; D.C. Phillott (Lieut.-Colonel) and R.F. Azoo, "Things which the Owners of Hawks Should Avoid, Being an Extract from the *Kitāb* 'l-Jamharah fi 'ilm' l-Bazarah," *Journal and Proceedings of the Asiatic Society of Bengal* (N.S.), III, 6 (1907), pp. 401-403.

⁴⁴ Björck used a French translation of Ibn al-ʿAwwām's treatise. See Gudmund Björck, "Griechische Pferdeheilkunde in arabischer Überlieferung," *Le Monde Oriental, Revue des Études Orientales* (Uppsala) vol. XXX (1936), pp. 1-12.

A renewed interest of Orientalists in the history of Arabic veterinary medicine can be observed from the 1960s onwards. Detlef Möller dedicated an important study to the Arabic falconry literature of the Middle Ages. According to him, Arabic falconry literature must have begun in the eighth century, and certainly existed in the ninth, with translations from Greek and Persian, quickly reaching an independent status. He maintained that the stagnation and temporary decline of the sciences after the flourishing of the ninth century were also manifested in the professional falconry treatises, while the thirteenth century saw the awakening of interest in falconry, expressed in the editing of material from previous centuries in encyclopaedic form. This second apex marked, according to Möller, the end of the original creative Arabic falconry literature. In other words, although almost all the treatises that he mentions, both those of a literary or encyclopaedic character and the falconry treatises, were written or copied in the Mamluk period, Möller does not attribute importance to the Mamluk period in regard to the development of writing on falconry.⁴⁵ In any case, his work is very useful for locating the many unpublished falconry and hawking treatises that are scattered in various libraries throughout the world.

Besides the already-mentioned editions of medieval hunting manuals, François Viré also published several important studies on medieval Arabic falconry, and studies on cheetahs and dogs in Arabic hunting literature. He is also the author of many related articles in the *Encyclopaedia of Islam*.⁴⁶

Behind the promising title of "Islam and Veterinary Medicine," ʿAdel a-Sayyid Aḥmad's book offers a rather disappointing presentation. Though mentioning the names of two authors of veterinary treatises (al-Dimyāṭī and Abū-Bakr), he makes no use of such writings, and mainly refers to religious and *adab* sources, whereas the medical materials that he uses are

⁴⁵ Möller, *Studien*.

⁴⁶ E.g. François Viré, "Sur L'identité de Moamin le Fauconnier," *Comptes rendus de l'Académie'Académie des Inscriptions et Belles-Lettres*, Paris, 1967, pp. 172-6; *idem*, "À propos des chiens de chasse saluqi et sagari," *Revue des Études Islamiques*, vol. XLI (1973), pp. 231-240; *idem*, "A Propose de la chasse au guépard d'après les sources arabes et les oeuvres d'art musulman par Ahmad Abd Ar-Raziq," *Arabica*, 21 (1974), pp. 84-88; *idem*, "Essai de détermination des oiseaux-de-vol mentionnés dans les principaux manuscrits arabes médiévaux sur la fauconnerie," *Arabica*, tom. XXIV, fasc. 2 (1977), pp. 138-149; *idem*, "Bayzara," *E.I.*² (1960), vol. I, pp. 1152a-1155a; *idem*, "Fahd," *E.I.*² (1965), vol. II, pp. 738b-743a. For a full bibliography of Viré's publications, see François Viré (†), trans., "L'utilisation du grand corbeau, d'après le traité de chasse d'Al-Asadi," preceded by Baudouin van den Abeele, "Notice bio-bibliographique sur François Viré, et de Le Grand Corbeau, oiseau de vol dans l'Islam medieval," *Arabica*, vol. LII/4 (2005), pp. 549-554.

gleaned from writings on human medicine. His approach is a kind of mixture between religion and philology.⁴⁷

Herbert Eisenstein has published several works relevant to our subject. His systematic survey of Arabic literature related to animals is quite useful, particularly in its chapters concerning horses and birds of prey used for hunting.⁴⁸ In an article published in 1995, he points to the weakness of the early studies of Arabic veterinary writings, mainly ascribed to the reliance of earlier scholars on French translations of the Arabic sources, which were often inaccurate and unreliable. He also raises the question as to whether Arabic treatises devoted to veterinary medicine can be considered medical treatises or rather belong to the classical Arabic literary genre known as *adab*.⁴⁹ In the final analysis, Eisenstein concludes that veterinary treatises did not attain the status of a separate genre, incorporating the spectrum of medical issues pertaining to domestic animals. He states that the only useful and accurate treatises on veterinary medicine were those devoted to horses and hunting birds, i.e., to valuable animals. On the other hand, these works were based on practical experience and could be applied in practise, which cannot always be said of other scientific treatises in Arabic literature, many of which can be attributed to the *adab* genre. In another article, Eisenstein discusses the role of the horse in Muslim-Arab cultural history.⁵⁰ Its major contribution to our subject matter is a rich bibliography included in the review of the works written from the beginning of the previous century. Although not directly related to veterinary medicine, Eisenstein's recent studies of the office of the Master of the Hunt (*Amīr Shikār*) in the Mamluk court is nevertheless relevant to our work in its broader conceptual framework.⁵¹

The relation between Greek, or rather early Byzantine veterinary treatises and medieval Arabic ones has been a recurrent theme in scholarly research. Therefore, Anne McCabe's recent study of the transmission of

⁴⁷ 'Ādil al-Sayyid Aḥmad, *al-Islām wa-al-ṭibb al-bayṭarī*, Cairo, 1986.

⁴⁸ Herbert Eisenstein, *Einführung in die arabische Zoographie, Das tierkundliche Wissen in der arabisch-islamischen Literatur*, Berlin: D. Reimer, 1991, esp. pp. 104-105, 157-182.

⁴⁹ *Idem*, "Las obras árabes de medicina veterinaria" p. 162.

⁵⁰ *Idem*, "Überlegungen zu einer Darstellung der Rolle des Pferdes in der arabischen—islamischen Kulturgeschichte," *Wiener Zeitschrift für die Kunde des Morgenlandes*, vol. LXXXVI (1996), pp. 107-117.

⁵¹ *Idem*, "Chronologie der Jagd-Emire unter den Mamluken-Sultanen," *Wiener Zeitschrift für die Kunde des Morgenlandes*, vol. LXXXII (1992), pp. 121-128; *Idem*, "Der amīr šikār unter den Mamlukensultanen," XXV. Deutscher Orientalistentag: Vorträge, Cornelia Wunsch (ed.), Munich, 8-13 April 1991, *Zeitschrift der Deutschen Morgenländischen Gesellschaft*, Suppl. 10, Stuttgart: Franz Steiner Verlag, 1994, pp. 129-135.

the Byzantine *Hippiatrica* is of special interest, particularly since it includes a chapter on the treatise written by the fourth-century writer Theomnestus, the fullest version of which is only preserved in an Arabic medieval translation (both extant manuscripts are from the Mamluk period). As we shall see, Theomnestus is referred to in Mamluk veterinary treatises more frequently than any other ancient writer of veterinary medicine. McCabe's examination of the Arabic text, carried out in collaboration with Robert Hoyland, and its comparison with references to Theomnestus' work in Greek sources, is instructive for the study of the transmission of knowledge in this field.⁵²

A group of German scholars have been dedicated in recent years to an interdisciplinary examination of what is believed to be the earliest Arabic treatise of veterinary medicine (practically horse medicine) known today—that of Muḥammad Ibn Y'aqūb Ibn Akhī Hizām al-Khuttulī, who lived in the second half of the ninth century. Philologists and veterinary physicians are collaborating in preparing a scientific edition of this work, and also in examining its contents. Martin Heide has published sections of this treatise in Arabic and in German translation, describing seven ailments that hinder the horse's mobility.⁵³ This work was used as a basis for further research in which, in addition to Heide, Veronica Veidenhöfer and Joris Peters were involved.⁵⁴ The first aim of this interdisciplinary research was to try and define, in modern medical terms, the ailments described in the medieval treatise. Its second aim was twofold: on the one hand, to try and find out to what extent this treatise, or rather its above-mentioned sections, derived from ancient Greek, Roman or Byzantine veterinary writings; and on the other, to examine what influence this treatise had on later medieval treatises of veterinary medicine, both those produced in Arabic and those produced in the medieval West until the fourteenth century. The conclusions of this examination are quite revealing. No significant influence by Greek or Roman writings on this text could be de-

⁵² Anne McCabe, *A Byzantine Encyclopaedia of Horse Medicine. The Sources, Compilation, and Transmission of the Hippiatrica*, Oxford Studies in Byzantium, Oxford: Oxford University Press, 2007, pp. 181-207.

⁵³ Martin Heide, "Beschreibung und Behandlung einiger Erkrankungen, die die Extremitäten der Pferd betreffen aus dem Kitāb al-furūsiya wa-l-bayṭara des Muḥammad ibn Ya'qūb ibn akhī Hizām al-Ḥuttulī, *Die Welt Des Orients*, vol. XXXIV (2004), pp. 105-152.

⁵⁴ Veronica Veidenhöfer, Martin Heide and Joris Peters, "Zur Frage der Kontinuität des hippiatrischen Erbes der Antike: Die Behandlung von Erkrankungen des Bewegungsapparates im *Kitāb al-furūsiya wa-l-bayṭara* von Muḥammad ibn Ya'qūb ibn akhī Hizām al-Ḥuttulī," *Sudhoffs Archiv*, vol. LXXXIX (2005), pp. 58-95.

tected. Likewise, there seems to be no significant influence of this work (at least as far as this section is concerned) on European veterinary treatises. However, there are clear indications of a continuous development between Ibn Akhī Hizām's work and later veterinary works written in medieval Arabic. This conclusion is of great significance, challenging some accepted beliefs both on the sources of Arabic veterinary medicine, and also on Arabic knowledge as a source of Western science.

A few other studies have been dedicated to the roles of animals in Mamluk society, but barely refer to veterinary medicine and to the level of knowledge of those who treated animals. For example, the Mamluk postal system, *barīd*, was investigated in the 1940s by Jean Sauvaget.⁵⁵ This book provides comprehensive material on the history and organisation of this system, but he does not deal with the medical treatment and health of the post horses. Likewise, Yūsuf Rāḡib's book on the postal pigeons is a serious study on one type of animal, but he too does not refer at all to veterinary aspects or to the Islamic veterinary sources. His discussion on the keepers of the postal pigeons and the entire system of care, hygiene, diet and medication is limited to general books on animals, particularly those of al-Jāhīz and al-Damīrī, which are zoology and *adab* books.⁵⁶ The chapter dedicated to the Mamluk *barīd* in Silverstein's study of postal systems in the pre-modern Islamic world is only marginally related to our subject.⁵⁷ Most recently Richard C. Foltz published his book on animals in Islamic tradition and Muslim cultures.⁵⁸ Though including a section on scientific works on animals, there is no mention in this book of the rich Arabic literature dedicated to veterinary medicine.

Finally, mention should be made of the works of philologists, such as Joseph von Hammer's old studies on the camel and on the horse, which, among many other sources, were also based on medieval Arabic veterinary treatises. These studies are helpful for their systematic presentation of Arabic terms describing different animal organs, as well as for the rich terminology related to the use of these animals in medieval Arabic culture.⁵⁹

⁵⁵ Jean Sauvaget, *La Poste aux chevaux dans l'empire des Mamelouks*, Paris: Librairie d'Amérique et d'Orient Adrien-Maisonneuve, 1941.

⁵⁶ Youssef Ragheb, *Les messagers volants en terre d'Islam*, Paris: CNRS Éditions, 2002.

⁵⁷ Adam J. Silverstein, *Postal Systems in the Pre-Modern Islamic World*, Cambridge: Cambridge University Press, 2007, pp. 165-185.

⁵⁸ Richard C. Foltz, *Animals in Islamic Tradition and Muslim Culture*, Oxford: Oneworld, 2006.

⁵⁹ Josef von Hammer-Purgstall, *Das Kamel*, Vienna: Kaiserlich-Königlichen Hof- und Staatsdruckerei, 1855-1856 (2 vols.) [Denkschriften der Kaiserlichen Akademie der

The historiographical survey presented here, though unfolding a growing interest in a subject that had been neglected far too long, also reveals a few weaknesses and lacunae. For example, no attempt has hitherto been made to encompass all branches of veterinary medicine in a common analytical framework. Moreover, the Islamic society that was apparently the most productive in this field⁶⁰—Mamluk society, has not attracted sufficient attention by scholars dealing with these issues. No attempt has been made to anchor the profession and those engaged in it in the society and culture of their time. The present study embraces an integrative approach to the profession and also attempts to investigate its cultural and social background. This has been done by using not only the professional veterinary writings (both published and unpublished) and the respective studies, but a large variety of other sources and related studies, such as writings on human medicine, pharmaceutical and agricultural treatises, *adab* writings, encyclopaedias, biographies, chronicles, religious literature, manuals for the market inspectors, as well as a few contemporary contracts and documents from the Cairo Geniza.

Wissenschaften, Philosophisch-Historische Classe, Vienna, vol. VI/1, 1855, VII/1, 1856; *idem.*, *Das Pferd bei den Arabern*, Vienna: Strauss and Cramer GmbH {Paul König}, 1855-1856 (reprinted in Hildesheim-New York: Olms Presse, 1981).

⁶⁰ In Cairo's National Library alone I have been able to detect 23 veterinary treatises attributed to this period.

CHAPTER ONE

ANIMALS IN MAMLUK SOCIETY

A. FARM AND PACK ANIMALS

The historical sources available on the Mamluk lands largely reflect the urban society and culture. Although Egyptian society during that period was basically agrarian, and the use of oxen, camels and donkeys for plowing fields and drawing water was practised in Egyptian agriculture from ancient times,¹ descriptions relating to the farmers' lives and ways of irrigating cultivated fields are scarcely to be found in the sources of the period.

The urban landscape of Mamluk Egypt and Syria is largely known to us thanks to descriptions by foreign travellers. In Cairo, the latter were particularly impressed by the omnipresence of donkeys. Even Mamluk sources sometimes make use of travelogues to describe their cities. Thus, al-Maqrīzī (who died in 845/1441-2) uses such a text written by a certain Abū Saʿīd, a thirteenth-century traveler from the Maghreb. The latter describes a donkey station situated near one of the important gates of the city, "Bāb Zwiḥah," and supplied transportation services to Fuṣṭāṭ, the oldest district in Cairo. Abū Saʿīd is quoted as remarking that he had never before seen so many donkeys in any city he had visited. He disliked the need to use a donkey as a means of transportation, describing the ride as a severe test, which was not made easier by the galloping of the donkey, spurred on by its driver. In the end he descended from the donkey in the midway and continued his journey on foot. However, a local friend who had accompanied him on this journey explained to him that riding a donkey was not considered undignified or demeaning in Egypt, for it was really common among people of high status. His friend's statement was substantiated when the Maghribī traveler saw intellectual and religious dignitaries and other upper-class people riding donkeys with no sign of embarrassment.²

¹ See for example: Robert H. Dunlop and David J. Williams, *Veterinary Medicine: An Illustrated History*, Mosby, St. Louis-Missouri, 1996, pp. 63-77.

² Taqī al-Dīn Aḥmad b. ʿAlī b. ʿAbd al-Qādir b. Muḥammad al-Maqrīzī (845/1441), *al-Mawāʿiẓ wa-al-iʿtibār bi-dhikr al-khiṭaṭ wa-al-āthār al-maʿrūf bi-al-khiṭaṭ al-maqrīzīyah*, Cairo: Maktabat al-Ādāb, 1996, vol. II, p. 147 [hereafter: al-Maqrīzī, *al-Khiṭaṭ*].

Some writers also refer to the extensive use of mules as a means of transport. Mules are comfortable to ride on and therefore they were often used by women. We sometimes come across unusual references to accidents while riding mules, such as the one that happened to the Chief Cadi of the Shāfi‘it stream in Damascus, Shihāb al-Dīn Muḥammad b. al-Majīd ‘Abd Allāh, when the mule he was riding crashed into a wall while crossing one of the narrow alleys of the city.³ However, accounts of death resulting from such “road accidents” are extremely rare, since the mule was the preferred vehicle for women and old people because it was considered so comfortable and safe.

Westerners writing about their travels in the Mamluk Empire were also impressed by the substantial presence of animals in the city streets. One traveler from the early sixteenth century writes: “Many of them would rather ride a horse than walk a quarter of a mile.”⁴ Meshulam of Volterra, who visited Egypt in 1481, remarks that only the Mamluks were allowed to use horses, adding, perhaps to console himself for having to ride a donkey, that the Egyptian donkeys were attractive.⁵ The animals used by Rabbi Ovadia of Bertinoro on his journey from Egypt to the Land of Israel were mainly camels. He writes that he and his friends hired five camels to cross the desert on their journey from Egypt to Gaza. Due to the lack of security in the area and the danger of attack by highwaymen, they chose to join an Ishmaelite caravan numbering 80 camels.⁶

The use of animals in construction work, mainly for carrying heavy loads and preparing foundations, was widespread during the Mamluk period, which was known as one of the most glorious periods of building and developing urban infrastructures in Egypt and in the other Mamluk territories. There was hardly a sultan or emir who failed to have his name engraved on one of his building projects, whether it was a mosque, a school, a hospital, or a tomb.

³ Al-Malik al-Mu‘ayyad ‘Imād al-Dīn Ismā‘il Ibn ‘Alī Abū al-Fidā [sic] (672-732/1273-1331), *al-Mukhtaṣar fī akhbār al-bashar*, eds. Muḥammad Zaynahum wa- Muḥammad ‘Azab wa-Yaḥyā Sayyid Ḥusayn and others, Cairo: Dār al-Ma‘ārif, 1998-1999, vol. IV, p. 142.

⁴ Leone Africanus, “Descrizione dell’Africa,” in G.B. Ramusio, *Navigazioni e viaggi*, ed. M. Milanesi, I, Torino, 1978, p. 412.

⁵ *The Travels of Meshulam of Volterra*, p. 46.

⁶ Adolf Reubauer, “Zwei Briefe Abadjah’s aus Bartenuro aus dem Jahre 5248 und 5249,” *Jahrbuch für die Geschichte der Juden u. des Judentums*, 3 Bd., Leipzig, 1863, p. 211; [Obadiah of Bartinoro], *From Italy to Jerusalem, The Letters of Rabbi Obadiah of Bartinoro from the Land of Israel*. A critical Edition with Introduction and Notes by Menachem Emanuele Artom and Abraham David, Ramat Gan: C.G. Foundation Jerusalem Project, Department of Land of Israel Studies, Bar-Ilan University, 1997, p. 61 [Hebrew]. Adler’s English edition of this text is unfortunately inaccurate. See Elkan Nathan Adler (ed.), *Jewish Travelers: A Treasury of Travelogues from 9 Centuries*, New York: Hermon Press, 1966 (2nd edition), pp. 231-232.

Countless magnificent buildings that were erected in Cairo during the Mamluk period are considered by scholars of Islamic art as the peak of Islamic architecture. These building projects, most of which still stand to this day, testify to the ambition of the ruling classes and the wealthy Mamluks, including sultans, viziers, emirs, army commanders, and even Mamluk women, to have their names perpetuated after their death and glorified in their lifetime.⁷

The quantity, the quality of the execution, the architectural design, and the embellishments adorning the structures testify to the use of work animals in their construction.⁸ The Mamluk chronicles refer extensively to these building projects, and al-Maqrīzī in particular devotes an entire essay to a description of many buildings in Cairo, occasionally referring to the building methods used. For example, with regard to the construction of the al-Ẓāhir Rukn al-Dīn Baybars al-Bunduqḍārī mosque, he writes that in the Hijri year 665 (1266), Sultan al-Ẓāhir Baybars wanted to build a new mosque in the al-Ḥusaynī neighborhood in the heart of Cairo. He appointed an officer Atābik named Fāris al-Dīn Aqtāi al-Musta'rib to be responsible for its construction, and to assist the Atābik he appointed one of the most important writers of veterinary books during that period: al-Ṣāḥib Fakhr al-Dīn Muḥammad, son of al-Ṣāḥib Bahā' Bashīr al-Dīn 'Alī b. Ḥannā.⁹ For this construction project, the sultan issued an edict demanding that marble columns be brought to the place from all corners of his sultanate, and to expedite the work he ordered the use of most of the camels, buffalo, cows and other beasts of burden that existed in the sultanate.¹⁰ This list indicates that the animals used for construction projects were mostly large ones that could help in tasks such as preparing the site, digging, laying the foundations, and above all carrying heavy building materials such as marble slabs, wooden beams, sand, cement, rocks, water, and so forth. The description also includes details of the transfer of objects for secondary use in building, such as marble slabs and wooden beams taken from Crusader buildings in Jaffa, and particularly from al-Qal'ah castle, which was abandoned after Baybars received the city of Jaffa following the signing of a

⁷ For a discussion of the Mamluk building projects and the characteristics of the Mamluk architecture, see Tawfīq Aḥmad 'Abd al-Jawwād, *Tārīkh al-'imārah wa-al-funūn al-islāmīyah*, Cairo: al-Maṭba'ah al-Faniyah al-Ḥadithah, 1969, pp. 115-130; Sa'd Zaghlūl 'Abd al-Ḥamid, *al-'Imārah wa-al-funūn fi dawlat al-Islām*, Alexandria: Mansha'at al-Ma'arif, 1968, pp. 463-48.

⁸ K.A.C. Creswell, *The Muslim Architecture of Egypt*, New York: Hacker Art Books, 1978 (2 vols.); Robert Hillenbrand, *Islamic Art and Architecture*, London: Thames and Hudson, 1999, pp. 138-166; Barbara Brend, *Islamic Art*, Cambridge, Mass: Harvard University Press, 1991, pp. 96-121; Carl J. Du Ry, *Art of Islam*, New York: Harry N. Abrams, 1970, pp. 142-147; 'Abd al-Jawwād, *Tārīkh al-'imārah*, pp. 115-130.

⁹ About this writer see Chapter III.

¹⁰ Al-Maqrīzī, *al-Khiṭaṭ*, vol. IV, p. 91.

peace treaty with the Crusaders. The marble slabs and wooden beams were transported to Egypt by sea, but clearly many beasts of burden were employed for this purpose.¹¹

In the Hijri year 818 (CE 1415), al-Maqrīzī reports the construction of one of Cairo's most magnificent mosques, called al-Jāmi' al-Mu'ayyad after its founder, Sultan al-Mu'ayyad. To build this mosque the builders had to destroy an entire neighborhood, and when they found bodies, skulls and the remains of many dead among the rubble they cleared the area with the help of a large number of camels and donkeys. The removal of the dead bodies, preparation of the ground and digging the foundations alone cost the sultan a huge fortune. In addition, large sums of money were paid to the workers who were employed in these jobs and on other items, including the purchase of 500 portions of food daily for the animals.¹²

Mamluk sources emphasize the extensive use of animals in Cairo's water supply system. The major use of camels in Cairo was for carrying water in skin bottles from the Nile and distributing it everywhere in the city, which in Mamluk time was considered to be, and in most probably was, one of the world's biggest cities.¹³ The people responsible for transporting the water were called "saqqā'ūn," and they were paid for supplying water to all parts of the city. The large number of water carriers going around the city with skin bottles on the backs of camels, donkeys and mules made a strong impression on the people of the period. One somewhat exaggerated description by a 14th-century traveler from North Africa named al-Balawī al-Maghribī estimates the number of water-carrying camels in Cairo as 200,000.¹⁴ The water was not used solely for private consumption, such as drinking or washing, but also for operating flour mills as well as bathhouses that were scattered throughout Muslim cities, particularly Cairo. Al-Maqrīzī enumerates some 80 bathhouses in Cairo alone in the second half of the thirteenth century.¹⁵ A regular water supply was

¹¹ *Ibid.*, p. 92.

¹² *Ibid.*, p. 137.

¹³ Ira M. Lapidus, *Muslim Cities in the later Middle Ages*, Cambridge Mss.: Harvard University Press, 1967, p. 79; John Alden Williams, "Urbanization and Monument Construction in Mamluk Cairo," *Muqarnas*, vol. 2 (1984), pp. 33, 40, 43; André Raymond, *Cairo*, Cambridge Mass. And London: Harvard University Press, 2000, pp. 119-120.

¹⁴ Al-Balwī al-Maghribī, *Rihlat al-Balawī al-Maghribī*, p. 55; Qāsim 'Abduh Qāsim, *'Aṣr salāṭīn al-Mamālik: al-tā'rikh al-siyāsī wa-al-ijtimā'ī*, Cairo: 'Ain li-al-Dirāsāt wa-al-Buḥūth al-Insāniyah wa-al-Ijtimā'iyah, 1998, pp. 329-330; Muḥammad b. 'Abd Allāh al-lawātī al-ma'rūf bi-Ibn Baṭṭūṭah, *Rihlat Ibn Baṭṭūṭah al-musammā tuḥfat al-nuẓẓār fī gharā'ib al-amṣār wa-'ajā'ib al-asfār*, ed. Muḥammad 'Abd al-Mun'im al-'Aryān, Beirut: Dār Iḥyā' al-'Ulūm, 1987, p. 55.

¹⁵ Al-Maqrīzī, *al-Khiṭaṭ*, vol. III, p. 129.

also needed in schools, hospitals, drinking fountains (*sabīls*, which the Mamluks had erected throughout the city) and mosques, where Muslims washed hands, face and feet for purification before prayer.¹⁶ In addition, water was sprinkled on the ground to cool the city streets and settle the dust in the sandy lanes. Some of the water carriers were officially appointed by the sultan,¹⁷ who issued a law requiring the water carriers to cover the sharp protruding corners of their vessels with soft cloth so as to avoid injury to the passers-by.¹⁸ It appears that the use of animals and people to transport water was Egypt's simple alternative to the Roman aqueduct system. Animals, especially camels and donkeys, helped the *saqqā'in* to transport water from the Nile to supply the city.¹⁹

Another cargo carried by camels and donkeys was sugar cane. This was an expensive commodity, and trade in sugar was declared the monopoly of the sultan, putting large sums in his pocket. The work of domestic animals did not end with carrying the sugar cane to the sugar mill. At the mill, the grindstones were operated by oxen, which are described by various writers as "oxen of superior quality."²⁰

Western travelers in Egypt were particularly impressed by the chicken hatcheries. The hatcheries provided an excellent solution to the food short-

¹⁶ Al-Maqrīzī, *al-Khiṭaṭ*, vol. III, p. 170, vol. IV, pp. 91, 137; Qāsim 'Abduh, *'Aṣr al-salāṭīn*, p. 329.

¹⁷ Meshulam of Volterra writes about those whose job it was to sprinkle the streets with water as follows: "And also in Egypt you will find more than ten thousand people occupied in throwing water in the city to stop the dust, and this water creates humidity. Also at every moment you will find more than two thousand people carrying water in skin bottles whose spouts are plated with Damascene gold and silver" See *The Travels of Meshulam of Volterra*, p. 54. Adler's translation of this passage is inaccurate. See Adler, *Jewish Travellers*, p. 168.

¹⁸ Qāsim, *'Aṣr salāṭīn*, pp. 213-253; Qāsim 'Abduh Qāsim, *Dirāsāt fī tā'rīkh Miṣr al-ijtimā'i — 'aṣr salāṭīn al-mamālīk*, Cairo: Dār al-Ma'ārif, 1983, pp. 130-133; Sa'id 'Āshūr, *al-Mujtama' al-miṣrī fī 'aṣr salāṭīn al-mamālīk*, Cairo: Dār al-Nahḍah al-'Arabīyah, 1962, pp. 90-91.

¹⁹ Ḍiyyā' al-Dīn Muḥammad b. Muḥammad b. Aḥmad al-Qurashī al-Shāfi'i known as Ibn al-Ukhuwwah, *Ma'ālim al-qurba fī aḥkām al-ḥisba* [sic], ed. R. Levey, Cambridge: Cambridge University Press, 1938, pp. 240-241; al-Maqrīzī, *al-Khiṭaṭ*, vol. II, p. 79-80; 'Abd al-Raḥman b. Muḥammad Ibn Khuldūn, *Muqaddimat Ibn Khaldūn—al-Juz' al-awwal min kitāb al-'ibar wa-dīwān al-mubtada' wa-al-kabar fī ayām al-'arab wa-al-'ajam wa-al-barbar waman 'āsarahum min dhawī al-suṭān al-akbar*, Beirut: Dār al-Fikr, n.d., p. 422; Ibrāhīm b. Muḥammad Aydamar al-'Alā'i al-shahīr bi- Ibn Duqmāq, *Kitāb al-Intiṣār li-wāsiṭat 'uqud al-amṣār*, Cairo: al-Maṭba'ah al-Kubrā al-Amīriyah bi-Bulāq, 1309H/1893, vol. IV, pp. 104-106; Qāsim, *'Aṣr al-salāṭīn*, pp. 326-329.

²⁰ Shihāb al-Dīn Aḥmad b. 'Abd al-Wahhāb al-Nuwayrī (d. 733/1332), *Nihāyat al-arab fī funūn al-adab*, photocopy from the manuscript of Dār al-Kutub, Cairo, vol. VIII, p. 264; about the importance of the sugar during the Mamluk period see al-Nuwayrī, *Nihāyat al-arab*, vol. VIII, pp. 267-272; Sato Tsugitaka, "Sugar in the Economic Life of Mamluk Egypt," *Mamluk Studies Review*, VIII (2), 2004, pp. 87-107.

age that is frequently mentioned in sources from that period, resulting mainly from the excessive population growth in various cities, particularly Cairo. This solution was possible due to the combination of technological development and accumulated knowledge about poultry breeding. The system required special installations that could maintain an even temperature throughout the three-week period until the eggs were hatched. To generate the heat for the hatcheries energy was obtained from burning the dung of farm animals, particularly cows and horses. This indicates interaction between the functions filled by the animals in the various branches of the farm. In addition to a steady supply of heat for the hatching process, the hatchlings had to be protected and kept healthy until they grew into hens. They were kept in coops that were called ovens by the western travelers. Meshulam of Volterra describes these “ovens,” which he saw in 1481: “They make hens in ovens because they heat the oven and put inside it the excrement of cattle and horses and place in them a thousand or two thousand eggs all at once, and this they do every day, so that live chickens are hatched in three weeks. And in this way they produce an infinite number of hens.”²¹

B. *FURŪSĪYAH*—THE ART OF HORSEMANSHIP

The education of a slave who was acquired as a child or youth consisted mainly of military training for his destiny as a Mamluk warrior and a soldier in the service of one emir or another.²² Their basic education was in the various forms of warfare that were included under the heading *furūsīyah* (horsemanship). Learning *furūsīyah* and becoming expert in its skills was the main guarantee of progress in the socio-political hierarchy of the Mamluks. Many emirs, regional governors and sultans had started off as slave boys and risen in the hierarchy by virtue of the military education they had received. Social progress based on talent in *furūsīyah* was one of the characteristics of the Mamluk period.

²¹ *The Travels of Meshulam of Volterra*, pp. 47-48. See also *The Pilgrimage of Arnold von Harff knight from Cologne, through Italy, Syria, Egypt, etc.*, ed. and trans. Malcolm Letts, F.S.A., London: The Hakluyt Society, 1946, p. 110.

²² Al-Maqrīzī discusses the various methods used in the education of Mamluks from the moment of their arrival at the court of the ruler in Cairo. He also refers to the subject matter they studied when they were young, particularly emphasizing their education in the doctrines of the new religion, in preparation for performing the basic religious duties. See al-Maqrīzī, *al-Khiṭaṭ*, vol. III, pp. 346-348.

There is a substantial body of literature from the Mamluk period discussing the equestrian arts and mounted warfare, known in Arabic as "*furūsīyah*."²³ Equestrian skills, both in war and in peacetime were very important, if not the most important, aspects in the life of the Mamluk elite. Several sultans, such as sultan Taymūr Bughā (872/1486), were reputed to be skilled in *furūsīyah*.²⁴

Furūsīyah in the Mamluk period included methods of warfare that had not previously existed. The sources state explicitly that it was a science in the full sense of the word and that anyone who aspired to be a cavalryman himself had to learn and practise equestrian skills. At the same time, they saw *furūsīyah* as a form of art that also encompassed various sports.²⁵

David Ayalon has already described *furūsīyah* as a customary method of military training among the Mamluks.²⁶ Although the Arabic essays of the period, particularly chronicles, contain a wealth of detail on battles and military campaigns, the technical terms used in referring to the military method are not easy to understand. The method is described in detail in the chronicles of Ibn Taghrī Birdī (812H/1409 CE–874H/1469 CE), a Mamluk who held an official military role and was the son of *atābik al-ʿaskar*. His intimate knowledge of *furūsīyah*, due to the fact that he belonged to the Mamluk military establishment, renders his chronicle one of the most important on this matter.²⁷ He writes that *furūsīyah* differs from courage and daring. A courageous man is one who struggles bravely with his rival, while the horseback rider is expert at riding his horse both forwards and backwards during the battle. A person well-trained in *furūsīyah* knows

²³ The term *furūsīyah* derives from the word *faras*, meaning horse, and hence *fāris*, a horseman or cavalier. David Ayalon conducts a comprehensive survey of the research done on *furūsīyah*. He uses the term "furusiya treatises" in its broadest sense, because they often deal not only with exercises in horsemanship but also with many other forms of military training. Ayalon also quotes A.N. Polliak's definition of *furūsīyah*: "the qualities that are essential for the perfect horseman, furusiya, may be defined as 'physical culture' rather than 'knightly qualities'. Among its branches we find the correct use of the bridle and spurs, expertise in thoroughbred horses, wrestling, spear exercises, preparation and use of bows and arrows, and more." See David Ayalon, *Gunpowder and Firearms in the Mamluk Sultanate: A Challenge to a Medieval Muslim Military Society*, Magnes Press, Hebrew University of Jerusalem, 1994, pp. 15–19, 68 (note 45). For a description of the combat and sports methods that are included in the framework of *furūsīyah* exercises, see figures 1–3, illustrating various kinds of *furūsīyah* exercises.

²⁴ Ibn Taghrī Birdī, *al-Nujūm*, vol. XVI, p. 335.

²⁵ David Ayalon, "Notes of the *Furūsīyah* Exercises and Games in the Mamluk Sultanate," *Scripta Hierosolymiana IX, Studies in Islamic History and Civilization*, ed. Uriel Heyd, Jerusalem, 1961, p. 36 (note 21). See also figures 1–3.

²⁶ Ayalon, "Notes," pp. 31–62.

²⁷ *Ibid.*, p. 32.

exactly the needs of the horse that serves him faithfully in battle, and also what is needed for the care of the weapons that serve him as a soldier and a fighter. He takes care of all these things according to the rules prescribed in the regulations that are known to all who are qualified in this matter.²⁸

1. *War and Jihad*

The Arabic translation of a treatise by Abū Dāʿūd (or Abū Duʿād) al-ʿIshbīlī²⁹ quotes an anecdote that indicates the importance of the horse as the best war animal on earth. A wise man, asked by a king which animal was most feared by the enemy, replied that it was the horse, which was the quickest, bravest and strongest in battle. The horse, he said, is endowed with a unique characteristic that distinguishes it from all the other animals, and that is its ability to rejoice at the enemy's defeat.³⁰

Mamluk treatises dealing with horsemanship often link it to the concept of Jihad. We find this linkage in treatises devoted to *furūsīyah*, written by professional horsemen³¹ and by scholars,³² and even in essays devoted to

²⁸ Jamāl al-Dīn Abī al-Maḥāsīn Yūsuf Ibn Taghrī Birdī al-Atābikī, *al-Nujūm al-zāhirah fī mulūk Miṣr wa-al-Qāhirah*, ed. Muḥammad Ḥusayn Shams al-Dīn, Beirut: Dār al-Kutub al-ʿIlmiyah, 1992 (16 vols.), vol. VI, p. 445; Ayalon, *Gunpowder*, p. 68 (note 45); The British Library, London, *Ms. ADD. 7513* (441), fol. 24r^o.

²⁹ Bodl., *Ms. Arab. d. 208*. A manuscript written in the *naskhī* script, for the most part not vocalized, and relatively clear. It declares on the first page the work to be a valuable book, written in a foreign language (*ʿajamī*) and translated into Arabic. Its author is claimed to be al-Ḥakīm Abū Dāʿūd al-ʿIshbīlī. The treatise has two parts: 1. on the nature of horses, their similarity to humans, and a description of their characteristics; 2. on ways of treating horses and methods of training, taming, and other aspects that are obligatory knowledge for the horse handler.

³⁰ In the first chapter of his treatise, al-ʿIshbīlī describes horses as animals that were created by God to frighten the enemy. They also have the highest status of all the animals except for those that speak (i.e., humans). The horse was also considered so strong that rulers building a new town would lay a horse's skull as a foundation stone of the town. See Bodl., *Ms. Arab. d. 208*, fol. 1v^o.

³¹ One of those whose personal knowledge and involvement in *furūsīyah* prompted them to write books on the subject was al-Ṣāḥib Tāj al-Dīn, who served as chief vizier under the Mamluks in Cairo. He devotes many pages to the topic of *jihād*, emphasizing the extensive experience that he acquired in battle. He defines the treatise as a book that comes to guide and instruct people preparing to engage in *jihād*, and therefore it includes various disciplines related to *furūsīyah*: riding, handling of horses, and the correct use of weapons. See Abū ʿAbd Allāh Muḥammad Ibn Muḥammad Ibn ʿAlī al-Ṣāḥib Tāj al-Dīn (d. 707/1307), *Kitāb al-Bayṭarah*, Book on Veterinary Medicine, Reproduced from MSS. 3698, 3609 *Fatih Collection*, Sülemaniye Library, Istanbul, ed. Fuat Sezgin, Frankfurt am Main: Institute for the History of Arabic-Islamic Science at the Johan Wolfgang Goethe University, 1984, Series C-Facsimile Editions, vols. 5, 1-2, pp. 22-42.

³² Among these we may count al-Dimyāṭī, an important *cadi* who functioned at the beginning of the Mamluk period (d. 705/1305). His book on horses was a model for other

veterinary medicine. They generally emphasize the precept of Jihad and associate it with holy war against infidels; however, in this period most of the war effort was directed against local adversaries, rulers and governors of regions who had rebelled against the central government in Cairo, demanding independence and refusing to send their regional taxes to the sultan. Countless battles and raids were conducted against Bedouin tribes who lay in wait for caravans of pilgrims along the hajj routes in order to steal the property of the pilgrims and of the merchants who accompanied the caravans.³³ Jihad also included internal internecine wars against Mamluk emirs who rebelled against the sultan and wanted to replace him with someone else.³⁴

Under the pretext of Jihad, Mamluk soldiers were sometimes even required to perform tasks in the service of the sultan or one of the emirs—the senior officers of the Mamluk army—such as digging canals, preparing the ground for building, constructing walls around castles, flattening the ground for the preparation of a hippodrome, and even transporting merchandise such as trees from Syria to Egypt.³⁵

A work entitled “*Furūsiyah* for the sake of Jihad” reflects the close link between *furūsiyah* and the Muslims’ holy wars against infidels. This treatise is devoted almost entirely to a description of various methods of warfare that the writer wishes to teach the cavalryman who encounters an adversary while on horseback. In his introduction to the book the author quotes passages from the Koran and various Hadith traditions praising holy war against the infidels and extolling those who fall while fulfilling the religious duty of Jihad.³⁶

writers. Al-Dimyāṭī devotes his first chapter to the advantages of horses designated for *jihād*. See Sharaf al-Dīn ‘Abd al-Mu’min al-Dimyāṭī, *Faḍl al-khayl*, Aleppo, 1930, p. 3; See also manuscript of the same treatise in The Bodleian Library, Oxford, Ms. Marsh 389.

³³ Ibn Taghrī Birdī, *Ḥawādith*, vol. II, p. 452.

³⁴ *Ibid.*, pp. 420–421.

³⁵ The chronicler Ibn Taghrī Birdī writes of the transportation of trees from the al-Lajjūn region in Syria to Cairo, describing the sultan’s preparations for the journey and his choice of the most suitable soldiers, as if it were a military campaign. Mamluks and emirs who were ordered to take part in this mission under the heading of *jihād* revolted against the sultan’s command when they understood that it was not connected with war and *jihād*. In the end the sultan was forced to cancel the project. See Ibn Taghrī Birdī, *Ḥawādith*, vol. II, pp. 573–574.

³⁶ In the critical edition of this book, published in Damascus in 1995, the editor expresses uncertainty as to the identity of its author. He assumes that it is either Ḥasan Baktūt al-Rammāh (13th century) or Muḥammad b. Lājīn al-Ṭarābulī (14th century), and tends to believe that the latter is the author. Muḥammad b. Lājīn b. ‘Abd Allāh al-Ḥusāmī al-Ṭarābulī, from Tripoli in Syria (659–738/1261–1338), is considered an expert in *furūsiyah* and combat. There are many manuscripts of this treatise in libraries in different parts of the world, which

The example of Sultan al-Nāṣir Muḥammad Ibn Qalāwūn, described by many chroniclers as a highly-gifted hunter, skilled in *furūsīyah* exercises,³⁷ who found himself in a precarious situation, illustrates how training in *furūsīyah* could save lives in the course of what was described as Jihad. The incident occurred when the sultan arrived at Karak castle, east of the River Jordan, where he found shelter and protection from some Mamluk emirs who had gained control of the sultanate. While he was crossing the draw-bridge it began to shake and collapse. His horse, which was sensitive and trained especially for carrying the sultan, sensed the danger and began to gallop towards the entrance, passing all the Mamluks who were ahead of him. A few moments after he had safely crossed the bridge, it collapsed completely and dozens of the sultan's Mamluk soldiers and many people of Karak who were there to greet him fell into the deep moat.³⁸ The chroniclers who describe this situation emphasize the sultan's nobleness and kindness in helping the Mamluks who had fallen into the moat. He himself led the rescuers, behaviour that was definitely exceptional among Mamluk sultans. This behaviour revealed that he possessed one of the characteristics of *furūsīyah* and also emphasized the special relationship between the horse and the sultan.

2. Competitions and Games

Furūsīyah also included many branches of the martial arts and sports that were not directly connected with horsemanship. Those who competed in horse races clearly possessed the highest status among Mamluk knights, but competitors in other sports also enjoyed high status and repute. The games belonging to the *furūsīyah* system included the following:

1. Sword or lance contests.
2. Polo.³⁹ Abū al-Fidā remarks on the dangers involved in this game, and recalls the case of one of the sons of Sultan al-Ẓāhir Baybars named al-Malik al-Sa'id Baraka, who died in AH 678 (1279) of an injury he sustained in a polo game when his horse stumbled. He

only goes to show that this field of knowledge was in great demand. The book includes 52 chapters devoted to *furūsīyah* and other forms of mounted combat. In fact, the entire book refers solely to fighting methods designed for mounted horsemen and does not deal at all with other forms of military combat, which certainly existed during the Mamluk period. See al-Ḥusāmī al-Ṭarābulṣī, *al-Furūsīyah bi-rasm al-jihād wamā a'adda Allāh li-al-mujāhidīn min al-'ibād*, ed. 'Arif Aḥmad 'Abd al-Ghanī, Damascus: Dār Kanān, 1995, pp. 11-12.

³⁷ On Sultan al-Nāṣir Muḥammad Ibn Qalāwūn's proficiency in riding and *furūsīyah*, and on his great love of horses see, for example al-Maqrīzī, *al-Khiṭaṭ*, vol. III, pp. 356-366.

³⁸ Abū al-Fidā, *al-Mukhtaṣar*, vol. IV, pp. 68-69.

³⁹ See figure 4.

was injured and died a few days later. He was buried in Damascus in his father's vault.⁴⁰

3. *Qabāq* games.⁴¹
4. Archery.
5. Fencing.
6. *Bardajās*.⁴²
7. *Fann al-Dabūs*. This was a game played with a kind of stick or rod with a ball-shaped head.⁴³
8. Wrestling.
9. *Maḥmil* games.⁴⁴
10. Hunting.⁴⁵
11. Marksmanship.⁴⁶
12. Horseracing.
13. Throwing the javelin.⁴⁷

⁴⁰ Abū al-Fidā, *al-Mukhtaṣar*, vol. IV, p. 21.

⁴¹ *Qabāq*, which Ayalon refers to as gourd games because the winner received a gourd as a prize, were popular in the *Baḥrī* Mamluk period, especially during the reign of the sultans al-Zāhir Baybars, Qalāwūn and Sultan al-Ashraf Khalil. This game involved skill in hitting a target such as a pigeon that was released into the air or a target hanging on a high column. See, for example, al-Maqrīzī, *al-Sulūk*, vol. I, p. 518 (Cairo pub.); Ibn Taghrī Birdī, *al-Nujūm*, vol. VIII, p. 6; al-Maqrīzī, *al-Khiṭaṭ*, vol. II, p. 111, vol. III, pp. 180-181; Ayalon, "Notes," pp. 55-56. See figure 3-b.

⁴² The *burdjās*, or *burjās* was a raised target, which was supposed to be hit while riding on horseback. Arabic dictionaries explain that the target was made of felt or some other soft material, which they placed on the horse with the saddle. According to Ibn Taghrī Birdī, Sultan Mu'ayyad al-Shaykh excelled at this game. See Ibn Taghrī Birdī, *al-Nujūm*, vol. XIII, p. 258; Ayalon, "Notes," p. 59.

⁴³ See figure 1.

⁴⁴ The *Maḥmil* is described by several writers as one of the official processions that were important to the Mamluk sultans. It included many elements of *furūsīyah*, such as the carrying of javelins. A large group of artists, known as *rammāḥah* carried the *maḥmil*—the canopy that the Mamluks carried on the pilgrimage to Mecca on behalf of the sultan. They also celebrated the *maḥmil* in the city streets on various holidays and festivals (See the section on pilgrimages in this chapter, and figure 5).

⁴⁵ See figure 2.

⁴⁶ Some sources mention Ibn al-Ḥummuṣī, who became famous for his skill in marksmanship. Abū al-Fidā, for example, tells of his personal acquaintance with this man and reports his impressions on witnessing a sports competition when Ibn al-Ḥummuṣī demonstrated his superb skill in marksmanship. He writes that Ibn al-Ḥummuṣī fired the *bunduq* (a bullet made of clay or various metals) at a target hanging on a wall. He goes on to describe how the man, in firing these bullets, demonstrated the calligraphic talent of a scribe. His skill was also expressed in shooting down objects that were thrown into the air. See Abū al-Fidā, *al-Mukhtaṣar*, vol. IV, p. 150; about the *bunduq* hobby see al-Maqrīzī, *al-Sulūk*, vol. III, p. 342; Aḥmad 'Abd'l-Raḥīq, "Wasā'il al-tasliyah 'ind al-Muslimin," *Dirāsāt fi al-ḥaḍārah al-islāmīyah bi-munāsabat al-qarn al-khāmīs 'ashr al-hijrī*, Cairo, 1985, vol. I, p. 114.

⁴⁷ Games or exercises involving the throwing of javelins or spears (which were also included in the *maḥmil* processions) are mentioned in various sources. These exercises

In addition to the title *Fāris* (cavalier or knight) that was bestowed on those who excelled in *furūsīyah*, the sources also mention other appellations earned by Mamluks who displayed expertise in some branch of *furūsīyah*, appellations that followed them throughout their lives and sometimes appeared in the names of their sons. For example, *al-Muṣāriʿ*—holder of a title in wrestling,⁴⁸ or the title *Muʿallim* or *Muʿallim al-rumḥ* for a champion javelin thrower; *Muʿallim al-nashshāb*, archery champion. *Ustādh* was a general title for someone who excelled in many sports. The writers made a point of mentioning the names of many Mamluks who were champions in *furūsīyah*, indicating the importance of the subject among these warriors. These branches of sport were an integral part of the skills they had to demonstrate in battle against the enemy.⁴⁹

C. HUNTING

Hunting was a popular form of entertainment among the Mamluk elite. Writers from that period describe the hunt at length and thus supply us with a wealth of information about Mamluk social customs. Hunting was an expensive pastime and only the upper classes, headed by the sultan, could engage in it. Senior Mamluk officers, such as *nāẓir al-iṣṭabl*, *amīr akhūr*,⁵⁰ *amīr shikār*, and others,⁵¹ were in charge of the

were more associated with *furūsīyah* than were the other branches of sport. It is usually claimed that the *furūsīyah* arts and javelin exercises developed during the period of Sultan Baybars, but Ibn Taghrī Birdī attributes the flourishing and development of many *furūsīyah* exercises to the period of Qalāwūn. See figures 1-3.

⁴⁸ Al-Maqrīzī enumerates the range of popular activities which he considers worthless, among them wrestling, boxing, and games with monkeys and bears. Al-Maqrīzī, *al-Sulūk*, vol. II, p. 642 (events of the year 744 H).

⁴⁹ Al-Ḥusāmī al-Ṭarābulṣī, *al-Furūsīyah*, pp. 7-9, 24; Ibn Taghrī Birdī, *al-Nujūm*, vol. VII, p. 844 (Popper); Ayalon, "Notes," pp. 58-61.

⁵⁰ *Amīr akhūr* was the title of the senior minister responsible for the horses, an important role in eastern Muslim courts. Among the Mamluks he was in charge of the sultan's stables, and was usually an "emir of a thousand," with three "emirs of forty" serving under him. During the Circassian period he was the fourth in rank in the Mamluk administrative system. Most of the chronicles mention the names of these officials, which reflects their importance in the Mamluk hierarchy. According to Ibn Taghrī Birdī, these emirs had to be skilled in *furūsīyah* and in mounted combat. D. Ayalon, "*amīr akhūr*," *E.I.*², vol. I, p. 442 b. Under the heading *nāẓir al-iṣṭablāt*, al-Maqrīzī attributes the *amīr akhūr*'s elevation to the highest rank, which included responsibility for all those employed in the care of the court animals, to Sultan al-Nāṣir Muḥammad Ibn Qalāwūn in the context of his huge investment in everything connected with thoroughbred horses. Al-Maqrīzī, *al-Khiṭaṭ*, vol. III, p. 365.

⁵¹ *Shikār* means "hunter" in Persian, and the title *amīr shikār* was given to the emir who was responsible for the sultan's hunting animals, including raptors such as falcons and hawks, as well as hunting animals such as hounds and trained cheetahs. This emir is

sultan's stables and hunting animals, as well as of the entire hunting operation.⁵²

1. *Perceptions of the Hunt*

The numerous treatises dealing specifically with hunting testify to its importance in the Mamluk period. The purpose of these essays was not only to provide vital information on hunting but also to entertain. Al-Nāṣirī, in the introduction to his essay on hunting, addressed to the ruler of Yemen (which was a protectorate of the Mamluk sultan in Egypt), notes that he distinguishes in the book between two types of hunting: practical hunting, which he calls "real hunting," and theoretical hunting. A closer reading of his explanations clarifies what he means. In real hunting the trained hunting animals are sent to catch the quarry, while in theoretical hunting the reader studies a book and uses his senses to absorb the contents. The author regards this, too, as a form of hunting, and he engages in word play, using the Arabic word *jawāriḥ*, which means both 'hunting animals' and 'senses'.⁵³ This explanation, which is unique to al-Nāṣirī, enhances the importance not only of practical hunting, but also of the study, reading, and theoretical use of hunting literature.

In Mamluk society hunting was closely related to *furūsīyah*, and there is barely a treatise on *furūsīyah* that does not refer to hunting. In peacetime,

described by al-Qalqashandī as "emir of ten" (*amīr 'ashara*). Another emir of similar rank was responsible for guarding the birds such as cranes that were the preserve of the sultan and forbidden for others to hunt. This emir was called *ḥāris al-ṭayr*. See Aḥmad b. 'Alī Abū al-'Abbās al-Qalqashandī, *Ṣubḥ al-a'shā fi ṣinā'at al-inshā*, Cairo: al-Mu'assasah al-Miṣriyah al-'Āmmah li-al-Ta'lif wa-al-Tarjamah wa-al-Ṭibā'ah wa-al-Nashr, 1964, vol. IV, p. 22. On the *amīr shikār*, see also Chapter IV.

⁵² The names of these role bearers generally appear in the Mamluk chronicles, emphasizing their senior status. Ibn Taghrī Birdī, for example, mentions the name of the emir Sayf al-Dīn Karājā, son of 'Abd Allāh al-Ḥusnī, who bore the title of *amīr ākhūr* for many years until his death in 853/1449. Karājā's appointment to this role followed his promotion from the senior rank of *ra'īs nawbat al-nūb*, which he received after rising in the military hierarchy from the rank of simple soldier to that of Emir of thousand (*taqdumāt alf*). In his biography the chronicler emphasizes that he was expert in *furūsīyah* and unrivalled in equestrianism. See Ibn Taghrī Birdī, *Ḥawādith*, vol. II, p. 235; see also al-Suyūṭī, *Ḥusn al-muḥāḍarah*, pp. 130-134; 'Afīf al-Dīn Ḥusayn b. Muḥammad Ibn Shihnah, *al-Badr al-zāhir fī naṣrat al-Malik al-Nāṣir Muḥammad b. Qāyṭbāy (901-904/1495-1499)*, ed. 'Umar 'Abd al-Salām Tadmuri, Beirut: Dār al-Kitāb al-'Arabī, 1983, p. 35; Ghars al-Dīn Khalīl Ibn Shāhīn al-Zāhirī (872/1476), *Kitāb Zubdat kashf al-mamālik wa-bayān al-ṭuruq wa-al-masālik*, ed. Büls Rāwīs, Paris, 1894, pp. 114-116. See also the account of Qamarī, who bore the role of *amīr shikār* and was a confidant of Sultan Ismā'il al-Ṣāliḥ. Ibn Ḥajar al-'Asqalānī, *al-Durar al-kāminah*, vol. III, p. 256.

⁵³ Al-Nāshirī, *Intihāz al-furaṣ*, p. 12.

when the Mamluk warriors were not engaged in battle, they needed some activity that would provide an outlet for their pent-up energy and allow them to use their skills, an activity suited to their lifestyle that would also help them to keep fit. Hunting was the ideal solution.

According to the Mamluk writers, hunting was the source of *furūsīyah*, and the ruler's engagement in hunting was of the utmost importance. This view was based on Aristotle's statement that hunting is the supreme occupation, which takes precedence even over building or agriculture. Hunting, according to these writers, strengthens the body and the mind. They mention its positive effect on the digestive system and on blood circulation, by causing the surplus humours to be expelled from the body. This, they write, is beneficial not only for the hunters but also for their horses, as it gives them an opportunity to exercise, to invigorate their body and preserve their health.⁵⁴

Ibn Mankalī, a Mamluk who served under many sultans and emirs in Egypt and spent most of his life in warfare and hunting, enumerates in his book on hunting ten advantages that may be derived from the hunt, particularly for a king or ruler. These advantages are: exercising horses, exercising the mind, deriving pleasure that is legitimate according to religious law, strengthening the courage, making the acquaintance of brave people, avoiding sin, eating according to one's needs, obtaining relief from worries and depression, removal of the causes of physical pain and surplus humours, and sharpening the mind.⁵⁵ This author also refers to the link between hunting and *furūsīyah*, stating that the essence of *furūsīyah* is knowledge of the rules of hunting on horseback. He indicates three criteria of the level and expertise of the rider in hunting and *furūsīyah*: one, knowledge of court etiquette and strict observance of it;⁵⁶ two, skill in archery;

⁵⁴ Al-Nāshirī, *Intihāz al-furaṣ*, p. 17; Ibn Qayyim al-Jawziyyah, *al-Furūsīyah*, Beirut: Dār al-Turāth al-ʿArabī, n. d., p. 17; Ibn Mankalī, *Kitāb Uns al-malā*, p. 78.

⁵⁵ Ibn Mankalī, *Kitāb Uns al-malā*, p. 78; Muḥammad b. ʿAlī b. Ṭabāṭibā Ibn al-Tiḡṭāqā, *al-Fakhri fī al-ādāb al-sulṭāniyyah*, Beirut: Dār Ṣādir 1996, p. 75; al-Ḥasan b. al-Ḥusayn Abū ʿAbd Allāh Bāzyār al-ʿAzīz billāh al-Fāṭimī, *Kitāb al-Bayzarah*, ed. Muḥammad Kurd ʿAlī, Damascus: Maṭbaʿat Majmaʿ al-lughah al-ʿArabīyah, 1409/1988, 18, 21; ʿAlī b. al-Ḥusayn al-Masʿūdī (d/ 346/957), *Murūj al-dhahab wa-maʿādin al-jawhar*, ed. Muḥammad Muḥyī al-Dīn ʿAbd al-Ḥamid, Beirut: Dār al-Fikr, 1393/1973, vol. IV, pp. 236-352.

⁵⁶ The writer uses the term *labāqah* in referring to an important rule of behaviour during the hunt. This term, which includes all the rules of behaviour mentioned above, is similar to another common expression in the Adab sources, *ẓurf*, and the person who behaves according to these rules is called *ẓarīf*. *Laṭīf* is a similar expression, relating to the characteristics required of the *nadīm*, the courtiers. *Labāqah* is used in the sense of physical beauty, fine attire, and also sharpness of mind and wisdom. See Ibn Mankalī, *Kitāb Uns al-malā*, p. 73.

three, equestrian skill, manifested by keeping a steady seat while chasing the quarry.⁵⁷

Genuine combat, both in battle with humans and in hunting, requires strength, cunning, physical fitness, and good judgment. The rules of behaviour during the hunt are described in detail in many books on hunting. One of the important rules is that equal status must be maintained between the leader and the other members of the hunting party.⁵⁸ This testifies to the general atmosphere that prevailed during the hunt, and particularly emphasizes the closeness and intimacy between the sultan and the other participants. The status of those who were allowed to take part in the hunt along with the sultan derived from this rule, since they were a group of people who were very close to the sultan. The equality of all the members of the hunting party ensured that they would derive the utmost pleasure from it, and was also explained as being guaranteed to arouse the competitive spirit that caused excitement and pleasure.

Al-Nāshirī, in his treatise on hunting (15th-16th century) counts the hunt among the four most popular forms of entertainment in Mamluk society that required egalitarian behaviour among their participants. The other three he mentions are chess, polo, and marksmanship or archery, stressing that in all these situations the ruler has to treat his fellow players as equals. The other players, on their part, have to be extremely cautious, and the writer especially warns against those who take advantage of this intimate situation with the ruler and behave sycophantically toward him.⁵⁹ The sultan's hunting companions have to be chosen with the utmost care because he is vulnerable during this activity. In fact, the close intimacy between the ruler and his companions sometimes even aroused criticism and was censured as religiously immoral.⁶⁰

⁵⁷ *Ibid.*

⁵⁸ Al-Nāshirī, *Intihāz al-furaṣ*, p. 16.

⁵⁹ *Ibid.*; Muḥammad b. 'Umar al-Zamakhsharī, *Rabī' al-abrār wa-nuṣūṣ al-akhbār*, ed. Salīm al-Na'imī, Baghdad: Maṭba'at al-Na'imī, 1980, vol. IV, p. 70.

⁶⁰ During the hunt, people who have complaints and have no access to the ruler might take advantage of the opportunity to present their complaints to the ruler. An example of this is the story of a poet who gained access to an eminent official whom he had not succeeded in reaching at the palace. The poet lay in wait for him on a hunting trip with ten deer and foxes that he had caught previously, and sent them one by one with notes attached to their tails containing messages from him. See Ibn Mankalī, *Kitāb Uns al-malā*, p. 80. Al-Maqrīzī describes one of the hunting trips of Sultan al-Ashraf Sha'bān, who used to take with him a large number of slave girls- singers, jars of wine, and people who engaged in all kinds of games and entertainment. See al-Maqrīzī, *al-Sulūk*, vol. II (1): pp. 713, 318 [ed. Ziyādah, Cairo, 1971]

In total contrast to al-Nāshirī's egalitarian approach, Ibn Mankalī refers to rules of behaviour in the hunt that are binding on the participants in terms of mutual respect, but in fact the idea behind them is inequality. He declares that even in an open space that is not in the ruler's court or palace, court etiquette must be observed. In other words, one must show respect to one's elders and those of higher social or religious status. To make his meaning perfectly clear, the author does not give a general explanation but specifies exactly how this is done in practise during the hunt. He says that the person of lower status must show suitable respect for the emir by avoiding chasing quarry that has been marked by someone of higher status. Even if a hunter of lower status receives permission to chase such quarry, he is forbidden to shoot arrows before the emir has tried and failed. He is also forbidden to show any sign of competitiveness with his social superiors during the hunt. He is permitted to show his skill in hunting only after receiving permission to join the emir in the chase after the quarry.⁶¹ Ibn Mankalī remarks that the difference between recklessness and bravery is transparent, and everyone with experience in the field recognizes it. Yet this writer's insistence on the importance of hierarchy in the hunt is not shared by the majority of writers on the subject.

A hunting trip could last for a long time; therefore it was important to be conversant with the religious laws in order to know how to observe the basic religious precepts during the hunt, particularly with regard to eating the game.⁶² Al-Nāshirī, for example, writes that it is forbidden for one going on a hunting trip to make light of the duty to pray and one should strictly observe the times of prayer.⁶³ His insistence on the performance of religious duties may be understood in light of the permissive atmosphere that prevailed among the hunters, since amusement was considered indecent in Islam, and even forbidden according to religious law. Several writers of hunting literature tried to contend with the subject and somewhat softened the severity of the religious prohibition by emphasizing *furūṣīyah*

⁶¹ This permission is granted in order not to lose the quarry when the emir in question has lost his chance of catching the quarry because his horse is tired or for some other reason. Ibn Mankalī, it appears from this book, had considerable experience of hunting. The book contains many illuminating remarks concerning the rules of behaviour during the hunt, along with sharp criticism of those who do not observe these rules. For instance, he warns against including people who are not worthy of joining the hunt. These people, in his opinion, only pretend to be brave and he decries them as foolish, licentious and reckless. Ibn Mankalī, *Kitāb Uns al-malā*, p. 67.

⁶² See, for example, the treatise of Ibn Mankalī on the rules of hunting and the Muslim regulations concerning the eating of the game. *Ibid.*, pp. 55-67.

⁶³ Al-Nāshirī, *Intihāz al-furaṣ*, p. 16.

and downplaying the aspect of amusement and entertainment. Quoting many sayings of the Prophet and verses from the Koran in an attempt to find suitable solutions,⁶⁴ they argued that these hunting trips were intended for *furūsīyah*, sport and obtaining meat rather than for entertainment.

Thus, al-Nāshirī writes that the purpose of the hunt is to obtain meat for eating and trading, for feeding the animals and birds, and for giving to the poor, or to friends as gifts. According to him, every other purpose is unworthy, and forbidden by religious law. Al-Nāshirī's explanations reflect the theological scholars' hesitation to condone entertainment and hobbies of this kind. Hunting means killing a living being, and to justify it, it had to be proven that it was not done for amusement. The basic need for obtaining food for people or animals was permissible and even considered worthy of reward. Al-Nāshirī's arguments are based on several sayings of the Prophet, one of which states "There is a reward on account of everything with a moist liver" [meaning every live animal]. According to the religious sources, this refers to the fact that one is required to help every living creature in order to save its life, for which he will be rewarded on the Day of Judgment. Al-Nāshirī manipulates this interpretation, writing that the feeding of trained hunting animals and raptors with the flesh of the prey is analogous to saving the life of a dying animal, as mentioned in the religious sources.⁶⁵ Yet, regardless of al-Nāshirī's explanations, it is doubtful whether those setting out on a hunt were motivated by the need for food or for ensuring a means of subsistence for their families.⁶⁶

⁶⁴ *Ibid.*, p. 26; al-Qur'ān, 5 (*Sūrat al-Mā'idah*): 96.

⁶⁵ Al-Nāshirī, *Intihāz al-furaṣ*, pp. 15-16; al-Suyūṭī, *al-Dibāj*, vol. V, pp. 259-260 (*Bāb faḍl sāqī al-bahā'im al-muhtaramah wa-ī'āmuhā*).

⁶⁶ Abū al-Fidā cites the story of a ruler who survived a very difficult situation thanks to his son's cheetah. In the year 651/1253 al-Malik al-Nāṣir Dā'ūd b. al-Mu'azzam, ruler of Karak, was imprisoned in a fortress by al-Malik al-Nāṣir Yūsuf, and released after the intervention of the Caliph al-Musta'ṣim himself on condition that he left the territory. Al-Malik al-Nāṣir wanted to go to Baghdad, but the governors of regions that were loyal to his enemy prevented him from leaving and obstructed him on every side. His situation deteriorated sharply because all the emirs united against him and he was trapped with all his entourage in a situation in which nobody was ready to help him. His only recourse was to wander around the desert regions in the height of summer when there was not even straw to feed his animals. Even the few governors who took pity on him and tried to help him by sending food received threats and warnings from his enemy al-Malik al-Nāṣir Yūsuf. He was saved by a cheetah in his charge which managed to hunt and bring him meat. Abū al-Fidā, *al-Mukhtaṣar*, vol. III, pp. 225-226.

The Mamluks' hunting expeditions and military campaigns are described extensively by the chroniclers,⁶⁷ who often refer to the hunting expeditions as an integral part of the military campaigns, in which many sultans took part. These expeditions called for preparation and organization, both on the part of the sultan and his emirs in Cairo, and by the governors of distant regions, who were responsible for hosting the sultan and his party in their town for the duration of his stay. The main item they had to arrange was the provision of food for all the participants, including the soldiers. Abū al-Fidā describes a military campaign of Sultan al-Malik al-Ashraf, who led his army from Egypt to Syria in 691 AH. Abū al-Fidā himself took part in the campaign as a Mamluk emir, and there were also soldiers who served under governors of districts in Syria. In the course of the campaign, the sultan went on a hunt, and many deer and wild donkeys were caught in the al-Zarqā' wa'l-Ḥammām region.⁶⁸ Abū al-Fidā's descriptions illustrate the interconnection between the military campaign and the hunting expedition, and accentuate the fact that the Mamluks were constantly occupied with both these activities.

2. Hunting Methods

The accounts of hunting expeditions describe the methods of hunting that were practised at the time. One of them is called in Arabic *ramy al-bunduq*—"throwing a bullet." This form of hunting became the favorite pastime of many Mamluk rulers.⁶⁹

Sultan al-Malik al-Ṣāliḥ 'Alā' al-Dīn b. Qalāwūn used this method to hunt pelicans.⁷⁰ Eating these birds is forbidden by religious laws, and they were mainly hunted for amusement or to be given to emirs and kings whom the sultan especially liked.⁷¹ The detailed descriptions of this hunting method lead us to conclude that it was complicated and required considerable patience. Abū al-Fidā describes the bullet hunting of his cousin al-Malik al-Muẓaffar Taqī al-Dīn, governor of Ḥamāt, in whose court Abū al-Fidā

⁶⁷ See, for instance, Ibn Taghrī Birdī, *al-Nujūm al-zāhirah*, vol. VIII, pp. 17-18 (events of 690 H).

⁶⁸ Abū al-Fidā, *al-Mukhtaṣar*, vol. IV, pp. 36-37.

⁶⁹ Sometimes this provided an opportunity for rivals to take advantage of the ruler's absence and gain control of the kingdom, as happened at the end of 657/1285. The two highest-ranking emirs, 'Alam al-Dīn al-Ghanamī and Sayf al-Dīn Bahādir went "to throw a bullet" and Quṭūz ambushed them on their return and trapped them. In this way he became the Mamluk sultan of Egypt. See Abū al-Fidā, *al-Mukhtaṣar*, vol. III, pp. 238-239.

⁷⁰ The sources indicate this place near *al-'Abbāsīyah* zone, out of Cairo.

⁷¹ Abū al-Fidā, *al-Mukhtaṣar*, vol. IV, pp. 25-26.

had served in his youth. His descriptions also include eagle hunting, which by all accounts was no easy task, and it is doubtful whether they could be hunted with tamed raptors. The method employed by the governor of Ḥamāt included the use of a slaughtered donkey as bait. Near the carcass he would build a hut, cover it with branches and wait inside for a long time. Only when the eagle approached the carcass could he catch it by throwing a bullet at it while it was busy with the carcass.⁷²

In the case of animals that were forbidden for eating, the main purpose of hunting them was to catch them alive and exhibit them in the court or the royal menagerie. Pelicans were large beautiful birds that could be displayed with pride in the royal garden, hence it was important to catch them without injuring them. As for eagles, perhaps the idea was to demonstrate the strength or skill of the ruler who caught the bird known as king of the sky, and thus also to draw an analogy between the royalty and power of the ruler and those of the bird which he had defeated. Ibn Mankalī, remarking that eagles were among the birds usually hunted in the Mamluk period, focuses on the medical benefits to be derived from the eagle's various parts. His descriptions of eagles are heavily seasoned with legends from classical literature, such as the eagle's ability to cross the earth from east to west in one day.⁷³ Such imaginary descriptions may help to explain the strong desire of many rulers and kings to hunt eagles. A practise of the time was to hang the eagle's dried heart on the arm as a talisman of wealth and status. An eagle's eye tied on the arm served as a charm to ward off devils and evil spirits.⁷⁴

3. *Purity of the Hunt*

The Mamluk chroniclers do not refer to the religious aspects of hunting unclean animals such as eagles and pelicans. Hunting treatises, on the other hand, discuss this issue extensively, quoting sayings of the Prophet and verses from the Koran. A salient example of this is a treatise by al-

⁷² The smell of the carcass became stronger and made all those present ill, according to Abū al-Fidā, who states that he himself almost died of this illness. He survived, but his uncle, the king, died following that hunt when he failed to catch the eagle, which managed to reach the carcass and eat a goodly portion of it. The king, who was inside the hut at the time, could not catch it because of the terrible stench emitted by the carcass. His uncle's death at the early age of 41, after reigning in Ḥamāt for 15 years, serves to illustrate that hunting was a dangerous hobby that could cause illness or even death. See Abū al-Fidā, *al-Mukhtaṣar*, vol. IV, p. 53.

⁷³ Ibn Mankalī, *Kitāb Uns al-malā*, p. 207.

⁷⁴ *Ibid.*, 207-209.

Nāshirī, a fifteenth-century Yemenite writer already referred to a few times, so there is no need to identify him here.⁷⁵

The ritual purity of the game is an important issue in these treatises, which enumerate the methods and tools of hunting that are considered ritually clean. The discussion focuses on two major points:

1. The use of dogs in hunting. This was an important question in view of the fact that the dog is regarded as an unclean animal and therefore the game might be contaminated by its bite or even its lightest touch.⁷⁶ To avoid such contamination, the authors suggest a few solutions based on religious principles. In the main, they advocate the simple solution of saying “In the name of Allah, the merciful and the compassionate” before releasing the hound to chase the prey. This was enough to legitimize the use of dogs and the eating of meat caught by them even if their teeth gnawed the meat. The writers also propose a similar solution for the use of predatory birds trained for hunting, such as falcons and hawks.⁷⁷

2. The purity of the hunter himself. The hunting literature devotes special chapters to this, listing the rules binding on the hunter in order for the game he catches to qualify as pure. Not only does the hunter himself have to be pure according to these rules, but so do the tools he uses, such as swords, arrows, knives, and bullets. A detailed discussion on hunting rules, entitled “Rules of behaviour and etiquette for the hunter and the tools he uses,” appears in the book by Ibn Mankalī that has already been mentioned several times. In this chapter Ibn Mankalī enumerates the rules of behaviour to be followed by everyone going on a hunt.⁷⁸ The rules are divided into three main categories: religious—related to Islamic law; social—related to social interactions during the hunt; professional—

⁷⁵ Al-Nāshirī, *Intihāz al-furaṣ*.

⁷⁶ On the use of dogs for hunting and solutions to the problem of religious impurity of dogs, see al-Suyūṭī, *al-Dibāj*, vol. V, pp. 7-10; al-Nāshirī, *Kitāb Intihāz al-furaṣ*, pp. 30-39. Kushājīm's hunting book also includes a wealth of material related to the subject of purity of the hunt. See, for example, Süleymaniye Kütüphanesi, Istanbul, *Ms. Faith 4090*, fols. 10r^o 15r^o, 39r^o-44v^o.

⁷⁷ “الحديث عن عدي رضي الله عنه أنه صلى الله عليه وسلم قال: ما علمت من كلب أو باز ثم أرسلته وذكر اسم الله فكل ما أمسك عليك قلت وإن قتل؟ قال: إذا قتل ولم يأكل منه شيئاً فإنما أمسك عليك” (أخرجه أبو داود) see al-Nāshirī, *Intihāz al-furaṣ*, pp. 24, 28, 29, 31; Ibn Mankalī, *Kitāb Uns al-malā*, pp. 56, 60; Abū al-Faṭḥ Maḥmūd b. al-Ḥasan al-Kātib al-Ma'rūf bi-Kushājīm (d. 358/968), *Kitāb al-Maṣā'id wa-al-maṭārid*, ed. Muḥammad As'ad Ṭalas, Baghdad: Dār al-Ma'rifah, 1954, p. 19. This issue had already been treated by the Andalusian Cadi Ibn Rushd (d. 1198) in his *Bidāyat al-mujtahid*. See Akasoy, “The Influence,” p. 51.

⁷⁸ Ibn Mankalī, *Kitāb Uns al-malā*, p. 67.

including laws and rules related to hunting. In the first category, the author emphasizes complete purification of every part of the body (bathing before the hunt). Going on a hunt is thus perceived as a religious obligation that requires total purity of the participants, like prayer.

4. *Equipment and Tools*

Ibn Mankalī discusses the rules for handling hunting tools, naming the various tools that are needed for the hunt and describing how they should be handled, and repaired if necessary. He cites examples of situations in which initiative and expertise are vital in order to save precious time. An example that he cites fondly involves a Mamluk soldier who accompanied him on a hunt. This soldier brought with him a small anvil (*sindān*) tied to the saddle of his horse and used it to mend arrowheads that were bent during the hunt so that they could be used again.⁷⁹ As well as an anvil, Ibn Mankalī recommends bringing knives of different kinds—for slaughtering the game and skinning it, as well as for stabbing the quarry. He also mentions several vital commodities for the trip, such as salt, spices and dishes for roasting meat. He explains what objects are forbidden, such as using an arrow as a meat skewer. In this context he also provides explanations on the shape of the bow, the choice of suitable arrows for different types of hunting, the bowstrings and the material of which they are made. He speaks of the necessity of examining the equipment before setting out on a hunting trip and describes how to mend a bow that is broken during the hunt. On this latter point, he remarks that it is hard to explain in writing: “The explanation in writing is hard and long and barely clear, while it can be explained simply and easily in spoken words.”⁸⁰

5. *The Hunting Party*

Who, then, are the hunters referred to in the hunting literature? Mostly, they are a small group of Mamluk soldiers who join the hunting expeditions of an emir or a sultan; the same group, in fact, that accompanies him in battles. Sometimes, the chroniclers state explicitly that the sultan’s choice of emirs for his hunting party is based on personal acquaintance as well as on hunting skills. Abū al-Fidā tells of his father and uncle, who were appointed governors of Ḥamāt and Aleppo in Syria, and accompanied Sultan al-Asraf Khalīl when he visited their region. Abū al-Fidā remarks that this

⁷⁹ *Ibid*, p. 69.

⁸⁰ *Ibid*, p. 71.

sultan used to go hunting with a group of trained cheetahs, and his (the author's) father and uncle were among the few well-connected people who were allowed to join the party. The sultan's choice of the chronicler's father, al-Malik al-Afḍal, among this select group was due to his repute as a skilled hunter. The author writes that the sultan was very fond of his father, and preferred him to his brother and others because of his special talent in hunting with cheetahs, which the sultan particularly loved. He relates that his father received an official invitation with the sultan's signature seal to come to Cairo at the beginning of the hunting season (the month of Tishrīn). His father decided to travel alone without his three sons, who at that time were serving their cousin al-Malik al-Muẓaffar, the governor of Aleppo. However, the father died before reaching the sultan's court in Cairo.⁸¹ Some years later (721/1321), Abū al-Fidā himself was officially invited by Sultan al-Nāṣir Muḥammad b. Qalāwūn to come to Egypt and join his hunting party. The chronicler writes that he traveled to Qalyūb by post horses, and there he met the sultan, who showered him with gifts, and joined the hunting party on a hunt planned by the sultan.⁸² The sultan's choice of Abū al-Fidā to join his hunting party indicates not only his hunting skills, which he certainly inherited from his father, but also his close relations with the sultan.⁸³

A hunting trip sometimes included a special ritual marking the coming of age of the son of a high-ranking emir or of a sultan. The young person's participation in the sultan's hunting party symbolized his inclusion in the group of emirs and thus also imposed on him the rules of adult society, the essence of which was loyalty to the ruler. One example cited describes how a young emir, Said Baraka Chan, the son of Sultan Baybars, participated in a hunting trip during which he had to choose a patron who would teach

⁸¹ Abū al-Fidā, *al-Mukhtaṣar*, vol. IV, pp. 39-40.

⁸² *Ibid.*, vol. IV, p. 106.

⁸³ Abū al-Fidā makes frequent mention of the fact that he received an official invitation from the sultan (*marsūm*) to join his hunting party. He sometimes uses the phrase "in order to serve him in the hunt," indicating that it was a kind of expression of allegiance to the sultan. In one case he describes a situation in which his son was very ill but he had to go out hunting with the sultan's party and he even took his sick son with him. During the entire hunt he was very worried about his son, who had a fever, and he writes that the Mamluk sultan, who was also concerned about the health of the writer's son, sent for the doctor Jamāl al-Dīn Ibrāhīm b. Abī Rabī' al-Maghribī, who headed a group of physicians in Cairo, and asked him to come and treat the sick boy. Abū al-Fidā describes the constraints of the situation which prevented him from serving the sultan and manifesting his allegiance throughout the entire hunting expedition, but he states that the sultan understood him and forgave him. See *Ibid.*, vol. IV, p. 114.

him the secrets of *furūsīyah*, hunting and government. His participation in the hunt symbolized the transition from youth and its freedom from responsibility to maturity in which he had to declare his loyalty to the government, to society and to the army.⁸⁴

Other people, who were not necessarily Mamluks, took part in the hunt. These were included in the sultan's party by virtue of some specific skill or knowledge that was needed during the hunt. Among them were physicians, veterinarians, servants, and cooks. The group of veterinarians, in addition to specialists in treating horses, might include other experts such as trainers and keepers of hunting animals, dog handlers, falconers, cheetah handlers, and more. The large number of participants in the Mamluks' hunting parties made a strong impression on western travelers. One of them reported seeing more than five thousand tents in the party of Sultan al-Dhāhir Barqūq, which was returning in 786/1384, from a hunting trip.⁸⁵

6. *Hunting Grounds and Their Perils*

Most of the Mamluk sultans' favorite hunting grounds were outside Cairo and were rich in vegetation and wild animals. One such area was near Qalyūb, which Abū al-Fidā mentions as a place where he went on a hunting trip when invited by Sultan al-Nāṣir Muḥammad. Another area used by many sultans was the desert region that stretched from near the pyramids of al-Jīzah to Ḥammāmāt in western Alexandria, a two-days ride away.⁸⁶ The fact of going to hunt in different areas was of great benefit to the ruler, as it enabled him to get to know the regions of his kingdom, especially in the desert areas. On these hunts the sultan saw with his own eyes the extent of his sultanate, both the towns and villages populated by

⁸⁴ Mounira Chapoutot-Remadi, discussing ritual in hunting, cites this example of the young prince Said Baraka Chan, the son of Baybars, who killed a goose during a hunt. His success was the first sign of his maturity and legitimized his inclusion in adult society. This was expressed in his choice of a patron to teach him the rules that were binding on everyone who belonged to Mamluk high society. This example, she argues, is congruent with the work of Jean Pierre Roux on ritual relating to sacred animals and plants in elite societies. In those societies hunting was the privilege of men, meaning youth who had reached maturity and become "complete" adults in terms of their status in society. Hunting as a ritual symbolizes the end of childhood. During the hunt the adolescent, by killing the animal, moves on to a new phase in his life, a phase in which he is required to express loyalty to another person in society. See Mounira Chapoutot-Remadi, "Symbolisme et formalisme de l'élite mamlūke: la cérémonie de l'accession à l'émirat," *Genèse de L'État moderne en Méditerranée*, Collection de L'École Française de Rome, vol. CLXVIII (1993), pp. 61-79.

⁸⁵ P.H. Dopp, "Le Caire vu par les voyageurs occidentaux du Moyen Age," *Bulletin de Société de Géographie d'Égypte*, vol. XXIII (1950), p. 131.

⁸⁶ *Ibid.*, vol. IV, p. 106.

his subjects and the desolate areas bare of housing and people. The desert trips could reveal new regions to the ruler and show him which areas could be developed for building towns. Knowing the territory encouraged the ruler to extend the areas of settlement in his sultanate.⁸⁷

Sometimes participation in a hunting expedition could cost sultans and emirs their lives. The danger was not so much in the hunt itself, and certainly not in the risk of being attacked by wild animals, but in the opportunity that it provided their enemies to take advantage of their being out in open spaces with no means of defense. In these circumstances the enemy could attack the sultan when he was at a distance from half his soldiers and bodyguards. This was a golden opportunity for adversaries to plot against a ruler whom they wanted to depose, to take him prisoner or even kill him.⁸⁸ Therefore, hunting expeditions required careful planning, taking all the precautions necessary for guarding the sultan. Nevertheless, all the precautions sometimes failed to save the sultan, as many examples show. One outstanding example that is often cited in Mamluk chronicles as a warning to rulers not to be taken unawares is that of Sultan al-Ashraf Khalil b. Qalāwūn, who was attacked while out on a hunting expedition.⁸⁹ The fact that this event is mentioned both in chronicles and in hunting books of the period attests to its importance, and above all the intention is to warn leaders of the dangers awaiting them on a hunt. Another incident concerns an important emir named Sayf al-Dīn Shaykhū, who occupied the highest position under Sultan al-Nāṣir Muḥammad and also under his successor, the sultan's son Ḥājī b. Muḥammad. Al-Maqrīzī writes that while this emir was away hunting in Ṭanān, in Egypt's al-Gharbiyah region, his enemies persuaded Sultan Ḥasan to issue a royal edict permitting them to arrest him and confiscate his property. They took advantage of his absence from the seat of government and managed to arouse the sultan's doubt regarding his loyalty. As a result, the emir was arrested and imprisoned for a long time, and was only released after the change of government and the enthronement of the new sultan, al-Malik al-Ṣāliḥ, in place of his ousted

⁸⁷ Ibn Mankalī, *Kitāb Uns al-malā*, p. 79.

⁸⁸ *Ibid.*, p. 42.

⁸⁹ *Ibid.*, p. 77; al-Ḥāfiẓ Ibn Kathīr al-Dimashqī Abū al-Fidā', *al-Bidāyah wa-al-nihāyah*, Beirut-Riyadh: Maktabat al-Ma'ārif, 1966, vol. XIII, pp. 334-335 (events 693 H); Ibn Taghrī Birdī, *al-Nujūm*, vol. VIII, pp. 3-27; al-Maqrīzī, *al-Sulūk*, vol. I, pp. 789-790; Abū al-Fidā', *al-Mukhtaṣar*, vol. IV, p. 40; al-Maqrīzī, *al-Khiṭaṭ*, vol. III, p. 388; Muḥammad b. Aḥmad Ibn Iyās al-Ḥanafī, *Badā'i' al-zuhūr fī waqā'i' al-duhūr*, Cairo: Dār Iḥyā' al-Kutub al-'Arabīyah, n. d., vol. I/1, pp. 373-374.

brother, Sultan Ḥasan.⁹⁰ An eminent Mamluk emir, Yalbughā, also underwent a severe test, in 768/1366, when a group of Mamluk commanders rebelled against him and even tried to assassinate him on one of his hunting trips. The rebels were among the emirs who accompanied him on that hunt, which made the danger even more acute. The sources report that by dint of his expertise and skill, and particularly thanks to his swift and faithful horse, he managed to escape from the group of rebels who ambushed him and attempted to kill him.⁹¹

7. *Animals that Participated in the Hunt*

i. *Horses*

Ibn Mankalī devotes special attention in his book to the rules for choosing horses. First of all, he states that two horses should be taken on every hunt, one for long runs and the other, the lighter one, for short runs. The choice of two different horses is related to the types of animals hunted; the horse that is good at long runs is used mainly for chasing wild donkeys and deer, which are able to run long distances. The second horse is used for cantering or for chasing slower animals. The rules for attaching the bridle, the reins, the saddle and the other necessary equipment are emphasized by Ibn Mankalī, who criticizes the use of a certain type of saddle that he considers unsuitable because it might hinder the hunt and even injure the horse, saying that this type of saddle had become popular in Egypt despite its drawbacks.⁹² Other rules concern the preparations for hunting, such as eating sparingly so as to be in good physical shape for the hunt.⁹³

Concern for the horses' health is salient in the hunting literature. It is strictly forbidden to tire the horse during the chase, particularly during the hot summer season. This rule was formulated to protect the horse from exhaustion, which might cause it irreversible damage, such as chronic illness or even death. This rule requires the rider to take into consideration the horse's natural ability and avoid overtiring it or endangering its health.

⁹⁰ Al-Maqrīzī, *al-Sulūk*, vol. IV, pp. 113-114.

⁹¹ See for example Ibn Duqmāq, *al-Jawhar al-thamīn*, p. 415; al-Maqrīzī, *al-Sulūk*, vol. III (1), p. 131; Ibn Iyās, *Badā'ī' al-zuhūr*, vol. I /2, pp. 27, 44 (events 768 H).

⁹² Ibn Mankalī decries the extensive use of a type of narrow saddle with a raised back, which he says was invented by the Turks. He writes that this invention was a serious mistake, mentioning all its disadvantages. For example, the elevated back prevents the rider from dismounting from the rear, and thus he may find himself in a situation where he is unable to escape. Ibn Mankalī, *Kitāb Uns al-malā*, p. 72.

⁹³ *Ibid.*, p. 78.

If the horse suffers from exhaustion but its life is saved, it must be released to graze freely in the open several times until it recovers and regains its strength. The religious tradition that “a Muslim is forbidden to waste money” is recruited by one of the writers to explain the prohibition on tiring a horse during the hunt.⁹⁴ Another principle determines that it is the hunter’s duty to examine his horse thoroughly before setting out on a hunting trip or going into battle. The examination includes the horse’s face, which is a prominent indicator of the state of its health. According to these rules, it is the hunter’s duty to know how to read the horse’s features in order to judge the state of its health.⁹⁵

ii. *Dogs*

In the higher strata of Mamluk society dogs were greatly valued as indispensable companions for hunting expeditions. Dogs occupy an important place in hunting treatises, and are also depicted in hunting scenes in Mamluk artefacts.⁹⁶ Arabic sources of the Mamluk period mention two types of dogs used for hunting: the *Salūqī* harriers, who were used for the chase, and the *zaghārīyah* or *zughārīyah*, also called “bush dogs” (*kilāb al-banj*), who served for detecting and pointing to hidden animals by scent, especially during hawking expeditions. During the ninth century, al-Jāḥiẓ had already mentioned a few other sorts of dogs, some of which might have also existed in later centuries in Mamluk territories: these were the *kurdī*, a sheep dog also used to track game; the *khilāṣī*—a cross-breed between the *kurdī* and the *salūqī*, followed by other crosses of this strain, who were hounds that hunted by smell; the *zīnī*, or *zī’nī*, a basset sheep-dog; the *qalaṭī*, or “stocky dog” that according to Viré, seems to belong to the type of the Pomeranian.⁹⁷

⁹⁴ *Ibid.*, p. 90.

⁹⁵ Ibn Mankalī notes that he did this himself and he used to examine the state of the horse by scrutinizing its features and stroking them before going out to hunt or to battle. *Ibid.*, p. 73.

⁹⁶ E.g. the brass canteen inlaid with silver (Syria, mid-13th century), in Esil Atil, W.T. Chase and Paul Jett, *Islamic Metalwork in the Freer Gallery of Art*, Washington, D.C.: Freer Gallery of Art, Smithsonian Institution, 1985, p. 125, ill. 17; the brass base of candlestand, inlaid with silver and gold (late 13th century), in Esin Atil, *Renaissance of Islam: Art of the Mamluks*, Washington, D.C.: Smithsonian Institution Press, 1981, p. 66 (ill. 17); the brass basin inlaid with silver and gold (Victoria and Albert Museum, 740-18980, *ibid.*, pp. 68-69 (ill. 18); the brass basin inlaid with silver and gold, known as the Baptistère of Saint Louis (Egypt, ca. 1290-1310) (Paris, Musée du Louvre, LP 16), *ibid.*, pp. 76-77 (ill. 21).

⁹⁷ François Viré, “À propos des chiens de chasse *salūqī* et *zaghārī*,” *Revue des Études Islamiques*, vol. XLI (1973), pp. 231-240, esp. 236 ff.; *idem*, “Kalb,” *E.I.*², vol. IV (1978), pp. 489-492.

Unlike most of the writers, who place hawks at the head of the list of hunting animals, Ibn Mankali ranks dogs in first place. Among other things, he discusses the choice of dogs, male or female, according to certain physical characteristics. He states that they should be trained from an early age, mainly in order to develop bonds of dependence and loyalty with the dog's trainer.⁹⁸ The selection of hunting dogs started already with the choice of the parents of the future dog. The pregnant mother received special care, rich and expensive food, such as special kinds of bread, fresh milk etc. Puppies too received rich food to strengthen their body, and also treats, such as honey or butter, to create a strong bond with their trainer.

The training of the puppies started at the age of two months. Sheep skin or a fox's tail were used to stimulate the young dogs's hunting instincts. At the age of five months, live mice and even rats were used for similar purposes. When reaching seven months of age, the young dogs were taken out to an open space in the desert, where they were taught to become members on a pack of three to four dogs, in hunting jerboas, followed by training to hunt rabbits. Only at a late stage were dogs allowed to hunt foxes. Young dogs were sometimes teamed up with older ones, from whom they could learn how to hunt. Dog trainers were responsible for the dogs' health and treatment, and were expected to be acquainted with all the infirmities and curing methods of the animals entrusted to their care.⁹⁹

iii. *Hunting Birds*

Islamic religious precepts considered birds of prey as unclean, which rendered the hunting of other animals by these birds somewhat problematic, since any physical contact with an unclean animal is believed to have a contaminating effect. Moreover, according to Islamic Law, the slaughter of animals for food had to be carried out according to certain rules, which were often impossible to implement in the course of the hunting expedition.¹⁰⁰ However such strictures do not seem to have bothered the Mamluks too much. The falconry and hawking manuals prepared for the Mamluk elite even include words of praise for eating fresh prey that had been caught in the course of such expeditions.¹⁰¹

The Fatimid Caliph al-'Azīz billāh is reported to have spent yearly 50,000 dinars on the birds of prey kept at his court. This anecdote, be it true or

⁹⁸ *Ibid.*, pp. 97-98.

⁹⁹ Ibn Mankalī, *Kitāb Uns al-malā*, pp. 141-142. The treatment of hunting dogs is discussed in detail in the following chapters.

¹⁰⁰ François Viré, "Bayzara," *E.I.*², vol. I, pp. 1152-1155.

¹⁰¹ Ibn Mankalī, *Kitāb Uns al-malā*, p. 82.

highly exaggerated, is repeated several times in Mamluk falconry and hawking treatises, probably reflecting a sort of nostalgia for a glorious phase of this occupation.¹⁰² But the Mamluks themselves were also very fond of this sport

Hawking and falconry were the most sophisticated methods of hunting and the birds themselves constituted an important status symbol.¹⁰³ The Mamluk sultans were ready to pay great sums of money to acquire the rarest sorts of hunting birds, such as gyrfalcons, which were brought over great distances either to be sold or as presents to the Sultan to obtain his favour.¹⁰⁴ Sultan al-Nāṣir Muḥammad Ibn Qalā'ūn is mentioned in contemporary sources as particularly keen on keeping birds of prey, an occupation which was also followed in the courts of his emirs.¹⁰⁵

The birds of prey mentioned in the Arabic sources as used for the hunt have been identified by Viré as the goshawk and its various subspecies, the Sparrowhawk and its short-footed subspecies, the gyrfalcon, the Saker, several subspecies of the Peregrine, the black-winged kite, the merlin, the hobby, the kestrel, the lesser kestrel, the red-footed falcon, the barbary lanner falcon, the Barbary falcon and Eleonora's falcon.¹⁰⁶ It is not quite clear whether eagles, used as sporting birds by the Turks and Persians,¹⁰⁷ were also used for the same purpose in Mamluk territories. At least one treatise written under the Mamluks includes eagles among the sporting birds.¹⁰⁸

The young falcons and hawks were normally caught through different methods described in the professional manuals.¹⁰⁹ The females are known to be better hunters, and were normally preferred for this purpose. When

¹⁰² See for example: Bughdī ibn 'Alī ibn Qushtumur, *Kitāb al-Qānūn al-wāḍiḥ fi mu'ālaḥat al-jawārīḥ*, Köprülü Kütüphanesi, Istanbul, Ms. 978, fol. 9v° (كتاب القانون، بغدي بن علي بن قشتمر، الواضح في معالجة الجوارح). See also the biography of al-'Azīz billāh in: Shams al-Dīn Muḥammad b. Aḥmad b. 'Uthmān al-Dhahabī, *Siyar a'lām al-nubalā*, ed. Shu'ab al-Arna'ūṭ and Ibrāhīm al-Zaybaq, Beirut: Mu'assat al-Risālah, 1986 (4th ed.), vol. XV, pp. 176-173.

¹⁰³ See figures 6-10.

¹⁰⁴ See below, section G.

¹⁰⁵ Ibn Taghrī Birdī, *al-Nujūm al-zāhirah*, vol. IX, p. 131.

¹⁰⁶ François Viré, "Bayzara," *E.I.²*, vol. I (1960), pp. 1152-1155. For a more detailed discussion of the kinds of birds used for the game and the problems of their identification, see Chapter V.

¹⁰⁷ *Ibid.*, p. 1153.

¹⁰⁸ Ibn Mankalī, *Kitāb Uns al-malā*, pp. 150-158, 180, 187, 200. For the identification of birds of prey mentioned in medieval Arabic sources, see also Louis Mercier, *La Chasse et les sports chez les Arabes*, Paris: Librairie des Sciences Politiques et Sociales, Marcel Rivière, Éditeur, 1927, pp. 81-96.

¹⁰⁹ Viré, "Bayzara," p. 1154.

captured, their eyes were temporarily sealed and their legs tied with jesses. They were then kept in a dark room without food for several days, to prepare them for taming. The process of training necessitated great patience and care. It was carried out by using training-birds as prey. The falcon or hawk had to be gradually familiarized with a noisy environment and with the company of other animals, such as horses and dogs. The training was crowned by success when, after killing the prey, the bird returned to the trainer's hand at the sound of the drum, receiving as a reward part of her takings.

Each falcon and hawk bore a proper name, and there are testimonies for great affection that developed between the bird and its owner. Medieval Arabic sources describe funerals that were held for dead falcons or hawks, which were no less ostentatious than those held for members of the ruler's family.¹¹⁰

Keeping these birds of prey demanded great expertise. They were not only highly expensive, but also most sensitive creatures, requiring a special diet and utmost care, especially during the period of muting. It necessitated the keeping of a staff of well-trained experts. The Master of the Hunt (*Amīr shikār*), responsible for the acquisition, care and upkeep of the birds, as well as for the organisation of the hunt itself, was sometimes among the sultan's closest companions.¹¹¹ The great cost involved in acquiring and keeping these birds was sometimes unbearable even to sultans, and in periods of economic difficulties, falconers were dismissed, and presumably the number of falcons reduced as well, to cut expenses.¹¹²

¹¹⁰ See, for example, Mu'ayyad al-Dawlah Abū Muẓaffar Usāmah Ibn Murshid Ibn Munqidh al-Kinānī al-Shayzarī, (d. 584/1188), *Kitāb al-I'tibār* (Usāmah's Memoirs), ed. Philip Hitti, Princeton: Princeton University Press, 1930, p. 206.

¹¹¹ Herbert Eisenstein, "Chronologie der Jagd-Emire unter den Mamluken-Sultanen," *Wiener Zeitschrift für die Kunde des Morgenlandes*, vol. LXXXII (1992), pp. 121-128; Idem., "Der amīr šikār unter den Mamlukensultanen," *XXV. Deutscher Orientalistentag, Vorträge. Munich, 8-13 April 1991*, Cornelia Wunsch (ed.), *Zeitschrift der deutschen morgenländischen Gesellschaft*, Supplement, vol. X (1994), pp. 129-135; Ibn Taghūrī Birdī, *Hawādith*, vol. II, p. 235; see also al-Suyūṭī, *Ḥusn al-muḥāḍarah*, pp. 130-134; 'Afīf al-Dīn Ḥusayn b. Muḥammad Ibn Shīḥnah, *al-Badr al-zāhir fī naṣrat al-Malik al-Nāṣir Muḥammad b. Qāyṭbāy* (901-904/1495-1499), ed. 'Umar 'Abd al-Salām Tadmūrī, Beirut: Dār al-Kitāb al-'Arabī, 1983, p. 35; Ghars al-Dīn Khalīl Ibn Shāhīn al-Ẓāhirī (872/1476), *Kitāb Zubdat kashf al-mamālik wa-bayān al-ṭuruq wa-al-masālik*, ed. Būlus Rāwīs, Paris, 1894, pp. 114-116. See also the account of Qamarī, who bore the role of *amīr shikār* and was a confidant of Sultan Ismā'il al-Ṣāliḥ. Ibn Ḥajar al-'Asqalānī, *al-Durar al-kāminah*, vol. III, p. 256.

¹¹² Al-Maqrīzī, *al-Sulūk*, vol. IV, p. 749.

iv. *Cheetahs*

Ibn Mankalī's descriptions of the hunting and taming of cheetahs are among the most detailed and testify to the use of cheetahs in hunting during the Mamluk period.¹¹³ He writes that two people are needed to catch a cheetah. They have to follow it for days and when the time comes to catch it they leave it alone, but make sure that it is aware of them. They continue their pursuit until the cheetah is totally exhausted and wants nothing but to lie down and sleep. Still, they harass it, but without getting too close, and keep pursuing it until the cheetah lies down on its side, a sign that it is worn out and is incapable of running. The hunter approaches the cheetah, first covering his face with a garment cloth so that the cheetah cannot recognize his features. Stepping quickly and confidently, he moves silently toward the cheetah. When the cheetah does not change its position and lies still sleeping on its side, the hunter throws a garment over it without exposing his face, simultaneously jumping on it from the side or from behind and grasping its neck to prevent the cheetah from raising its head or getting to its feet. Then, placing his left thigh on the cheetah's thighs, he presses hard so that it cannot move, and quickly ties round its neck a rope that he has prepared in advance, taking care not to choke it or cause it too much discomfort. At this point the hunter's assistant comes onto the scene and ties the cheetah's forelegs and hind legs. After tightening the ropes they plant two pegs in the ground, one for the cheetah's hind legs and the other for its forelegs, and attach the ropes to them. Only after all these knots are secured can the hunter approach the cheetah's head and tie that, too, while it is still covered with a garment. They wrap its paws in cloth to protect themselves from its claws.

At this stage, the cheetah must not be moved from its place. It is offered some cheese to eat; if the cheetah agrees to lick the cheese, this is the first sign that it can be approached. In the second stage, they feed it with small pieces of meat which the tamer puts straight into its mouth while its face is still covered with a cloth. At a later stage, he exposes the cheetah's face while keeping his own face covered. Ibn Mankalī emphasizes the importance of extreme caution on the part of the hunter-tamer and of not revealing his face to this predatory animal, explaining that this is significant for the training process and for the animal's obedience to him in the future.

¹¹³ Ibn Mankalī, *Kitāb Uns al-malā*, pp. 129-134. Ibn Mankalī counts cats as hunting animals, remarking that their nature is similar to that of cheetahs. He writes that cats were trained to hunt birds, especially partridges. See *Ibid.*, p. 147.

Although his face is hidden, the hunter must keep on speaking to the cheetah to accustom it to his voice. Moving the cheetah to a different place to continue the taming process also requires special skill. In the new place they put a kind of pillow filled with straw for the cheetah to rest its head on, and during the first few days after the move they have to ensure that people stay around it or nearby, while one of them (the tamer) always sits behind it with his left leg over the cheetah's side to prevent it from moving. The tamer holds a bowl full of pieces of cheese, with which he feeds the cheetah every time it raises its head. He also feeds it slowly with small pieces of fresh meat from a metal tray.

After seven days they remove the peg that is near the cheetah's shoulders, to enable it to raise its chest, and after ten days they remove the peg that is tied to its forelegs, and then tie it again with a strong rope. After this they release the cheetah's hind legs from the peg and tie them to its forelegs to prevent it from standing on its feet. They continue to feed it with pieces of cheese and begin to get it used to the fact that it will not be given meat until it stands on its feet. Even if it howls and begs for meat they do not give in until it makes an effort and succeeds in standing on its feet.

For the first ten days they do not allow the cheetah to sleep, in order to make it completely exhausted and thus hasten its surrender and loss of pride. They stay beside it all through the night, taking turns so that it will not be left alone even for a moment, and if it refuses to eat and tries to sleep they wake it up by force. Throughout those ten days they have to prevent it from seeing the tamer's face and they always approach it from the side and not face to face. They use the right hand to feed it with pieces of cheese while raising the left hand above its head as if to stroke it. If the cheetah grabs the food voraciously because it is ravenous, they move the bowl of meat a little further away, looking straight into its eyes and speaking aloud to it. At this stage, writes the author, it is better to leave the cheetah alone and keep everybody away except for the tamer.

As stated, Ibn Mankalī also enters into a psychological analysis of the cheetah, saying that the cheetah, as a wild animal, understands that the hunter—the human—is its enemy, therefore the hunter must treat it with great caution. He compares the cheetah to the hawk in terms of difficulty of taming. The difficulty is not only connected with persuading the cheetah to take the food it is offered in a special bowl tied to a chain, but also with helping it to overcome its fear of noises and sounds made by the tamer while feeding it. Another difficulty described by the writer concerns the training of the cheetah to ride a horse, considered to be elementary for

hunting, in view of the great distance that had to be covered before reaching the hunting grounds.¹¹⁴ After that the cheetah was trained to hunt deer and other animals. The latter did not require much effort, considering the cheetah's highly developed hunting instinct.¹¹⁵

Cheetahs trained for hunting are sometimes described as the most interesting hunting animals, and accordingly they occupied a place of honor in the courts of many rulers. Among these was the court of the father of Usāmah b. Munqidh, whose stories about his father's cheetah can be considered as representative of Mamluk customs despite the fact that his father, in fact, preceded this period.¹¹⁶

D. PROCESSIONS AND CELEBRATIONS

Processions during which the sultan appeared in public played an important social and political role in the Mamluk period. These processions took place mainly on the main Muslim festivals such as *Īd al-ʿAḍḥā*, *Īd al-Fiṭr*, the *Hijrī* New Year, and the birthday of the Prophet (*al-Mawlid*). Besides these, large processions were held during special celebrations that the Mamluks had inherited from their predecessors, such as the festival of *Nayrūz*, which was of Persian origin, and a festival celebrating the rising of the Nile and the flooding of the cultivated fields, which dated back to earlier times. Magnificent processions and festivities were also held in Cairo to celebrate victories in battle or the appointment of a new sultan.¹¹⁷

Such splendid and lavish processions required numerous animals, which were unquestionably the base of the entire event. The many animals that took part in the processions were decorated with great splendor, especially the horses. To add glory and prestige to the event, expensive and rare gifts received by the sultans from various rulers in the world were displayed. One reason for the importance of processions to Mamluk society was that they provided an opportunity for direct contact between the sultan and

¹¹⁴ See a mamluk water-basin on which a horse-riding cheetah is depicted in http://www.discoverislimcart.org/database_item.php?id=object;ISL;de;Musoi;48;en&cp [entered on 25.6.2011]. See also figures 11-12.

¹¹⁵ Ibn Mankalī mentions different types of cheetahs and discusses the differences in the hunting skills of the various types. Ibn Mankalī, *Kitāb Uns al-malā*, pp. 129-134.

¹¹⁶ Ibn Munqidh, *Kitāb al-Iʿtibār*, pp. 207-208.

¹¹⁷ On festivities in Cairo during the Mamluk period, see Qāsim, *ʿAṣr salāḥīn*, pp. 288-310. On the celebrations in Damascus and Cairo in honor of Sultan al-Malik al-Nāṣir's ascension to the throne for the third time, in 710/1310, see al-Maqrīzī, *al-Khiṭaṭ*, vol. III, p. 326; Ibn Aybak al-Dawādār, *al-Durr al-fākhir*, pp. 167-185.

the Mamluks who served him. These public occasions were used to present emirs and announce their appointment to key government roles, and the emirs on their part could present their soldiers to the sultan, which was important for demonstrating the prestige and power of the emir to the public at large.

Mamluk writers described the festive atmosphere at the sultan's processions, as he strode through the city accompanied by his entourage and all the high-ranking Mamluk emirs in all their glory. The mounted soldiers in their splendid uniforms were a great attraction for the audience,¹¹⁸ as they demonstrated their military skills, expressed mainly in cavalry games, *furūsiyah* (described at length earlier in this chapter).

The procession generally included distribution of gifts and awards to the Mamluk emirs and their soldiers. As mentioned, public presentation of awards and gifts was an important sign of the recipient's status and prestige, and sometimes served as the announcement of a new role conferred on him or a promotion in his military and political rank. The gifts generally consisted of horses along with all their tackle, since it was not only the horse's pedigree that testified to the recipient's status but also the relevant equipment. An emir of high status usually received expensive tackle on a thoroughbred horse, with saddles and other items made of gold and silver, while a low-ranking Mamluk cavalry soldier received a non-pedigree horse without any of the accessories. Western travelers were highly impressed by the saddles presented to the emirs during these processions, as they mention in the accounts of their journeys.¹¹⁹ As well as horses, the sultan distributed properties and estates on the occasion of the procession, with the highest ranking Mamluks receiving large estates, which would enable them to provide for the soldiers under their command.

¹¹⁸ An illustration dated 1237, shows a procession of horseback riders bearing flags embroidered with texts such as "There is no god but Allah," {لَا إِلَهَ إِلَّا اللَّهُ} some of them also blowing trumpets. See Richard Ettinghausen, *Arab Painting*, Geneva and New York: Skira and Rizzoli, 1977, p. 118.

¹¹⁹ Rabbi Meshullam Ben R. Menahem of Volterra (1481) remarks: "The saddles of the donkeys are worth very much, and the mamelukes wear on their horse-saddles many precious stones, pearls, and also on the bridles, beyond description." See Elkan Nathan Adler (ed.), *Jewish travelers: A treasury of travelogues from 9 centuries*, New York: Hermon Press, 1966 (2nd ed.), pp. 168-169. In other place the same traveler describe: "Their donkeys are very fine indeed and fat and they carry valuable "bardili" and "soli" as ornaments. I saw one donkey's baradili, which were worth more than 2,000 ducats, made of precious stones and diamonds with golden fringe which they put upon it and especially the front of the bardili in front of the donkey." *Ibid.*, p. 159.

The connection between animals and the Month of the Sacrifice, *ʿĪd al-ʿAḏḥā* requires little explanation, since it is still customary in the Muslim world to sacrifice animals, particularly sheep, during this festival in memory of the event when the Prophet Abraham was about to sacrifice his son Ishmael as a sign of his belief and obedience to the divine command.¹²⁰ The custom of slaughtering a sheep in honor of the Festival of the Sacrifice is perceived as a religious obligation, to be performed by every family in the courtyard of its house or at the entrance. However, there is interesting evidence from the Mamluk period that the Cairenes preferred to buy meat of different kinds from butchers' shops instead of slaughtering sheep in their homes. The same source adds that this practise did not stem from their inability to purchase sheep but out of convenience.¹²¹ Another custom connected with this festival was to ride around the city in processions of chariots drawn by animals, while the women and girls broke into song and drumming as a sign of joy at the coming of the festival.¹²² The Egyptians used to slaughter chickens on another festival unconnected with the sacrifice, the Festival of the Tenth, which they celebrated on the tenth of the month of *Muḥarram* (the first month in the *Hijrī* year). In the Shiite culture this is a day of mourning and remembrance of the slaughter of al-Ḥusayn Ibn ʿAlī and his retinue at the Battle of Karbala.¹²³ Like several other festivals, this was a holdover from the Fātimīd (Shīʿite) period.

The festival known as *Wafāʾ al-Nīl*, the rising of the Nile, was the most important festival in Egypt, because the overflowing of the Nile determined the fate of the crops in the subsequent year. People from all walks of life took part, simple folk and gentry alike, as well as a large group of Mamluk emirs and soldiers, and the sultan himself would honor the event with his presence. In a structure known as *Miqyās al-Rawḍah* [The Nilometer on Rawḍah Island in Cairo]¹²⁴ they would measure the rising of the water

¹²⁰ The Muslims believe that it was Ishmael who was about to be sacrificed by his father Abraham, when at the last moment God sent down a sheep with the angel Gabriel. It is customary throughout the Muslim world to commemorate this event by sacrificing animals. There is a debate in the Islamic sources concerning the identity of the son, whether it was Ishmael or Isaac. See, for example *al-Qurʾān al-karīm wa-bi ḥamishihi tafsīr al-imāmayn al-jalīlayn al-ʿallāmah Jalāl al-Dīn Muḥammad b. Aḥmad wa-Jalāl al-Dīn ʿAbd al-Raḥmān al-Suyūṭī*, Damascus: al-Maktabah al-Hashimiyyah, 1985, Surat al-Ṣāfāt (37: 101-107).

¹²¹ Qāsim, *ʿAṣr Salāṭīn*, p. 293; Abū ʿAbd Allāh Muḥammad b. Muḥammad al-ʿAbdarī al-Fāsī al-maʾrūf bi (known as)-Ibn al-Ḥāj (d. 737/1336), *al-Madkhal ilā al-sharʾ al-sharīf*, Beirut: Dār al-Kitāb al-ʿArabī, 1972, vol. I, pp. 276-293.

¹²² Qāsim, *ʿAṣr Salāṭīn*, p. 293.

¹²³ *Ibid.*

¹²⁴ Doris Behrens-Abouseif, *Islamic Architecture in Cairo: An Introduction*, Leiden: E.J. Brill, 1992, pp. 50-51; Ruska, J. "Miqyās." *E.I.*², vol. VII, p. 39; al-Maqrīzī, *al-khiṭaṭ*, vol. I,

level every day from the beginning of the season when the Nile waters started to rise. The celebration began as soon as it was announced publicly in the city. The traveler Piloti of Crete, describing one of these celebrations that took place while he was visiting Egypt early in the 15th century, remarks that he saw Mamluk horsemen riding out to the *Miqyās* every day bearing flags.¹²⁵ There they waited for the measurers to come and measure the water level, and on receiving the information they rode back in a festive procession and paraded around the city announcing loudly how much the water had risen in the *Miqyās*.¹²⁶ The rise in the water level was measured for a few days, and when it reached the height of 16 cubits [*dhirāʿ*] the celebrations began. The sultan sat on a balcony at the front of the *Miqyās* structure, and as soon as the water reached the height required, a yellow curtain was hung on the balcony to signal the commencement of the celebrations. The night of *Wafāʾ al-Nīl*, celebrated by people of all classes of society, became a festival during which the sultan distributed gifts to the Mamluks. During this festival they used to light up the city with lanterns and with thousands of candles, turning night into day.¹²⁷ The following day a table was spread with delicacies, and all the citizens were invited to come and eat.

It is not easy to give an accurate description of a procession with the participation of the Mamluk sultan during these celebrations, because the chroniclers often left out many small details. However, from the information they do supply we can reconstruct the picture of a lavish procession with diverse groups of people and animals, generally including a large number of racehorses carrying Mamluk horsemen. These horses were adorned with golden decorations and presented to the sultan. Ibn Iyās notes that in 882/1477, as many as 250 horses walked in such a procession in Alexandria. In 921/1515, he mentions 254 horses, 16 rows of camels and

pp. 92-98; K.A.C. Creswell, *Early Muslim Architecture*, New York: Hacker Art Books, 1979, vol. II, pp. 290-307, plates. 80-82; Idim, *A Short Account of Early Muslim Architecture*, revised and supplemented by James W. Allan, Cairo: The American University in Cairo Press, 1989, pp. 383-385.

¹²⁵ In the Arabic sources, the group of Mamluks who had the job of announcing in the city streets that the Nile had risen is called *munādī al-baḥr*. See Qāsim, *ʿAṣr salāṭīn*, p. 303; al-Suyūṭī, *Ḥusn al-muḥāḍarah*, vol. II, pp. 366-373; Ibn Duqmāq, *Kitāb al-Intiṣār*, pp. 114-115; al-Zāhirī, *Ḍubdat kashf*, p. 87; Ibn Ḥāhīrah, *al-Faḍāʾil al-bāḥirah fī maḥāsin Miṣr wa-al-Qāhīrah*, ed. Muṣṭafā al-Saqqā wa-Kāmil al-Muhanddis, Cairo: Dār al-Kutub, 1969, p. 200.

¹²⁶ Qāsim, *ʿAṣr salāṭīn*, 302-303; Emmanuel Piloti (b. ca. 1371), *L'Égypte au Commencement du quatorzième siècle: d'après le traité d'Emmanuel piloti de Crète*, incipit 1420, avec une introd. Et notes par P.H. Dopp, Université Fouad 1^{er}, Le Caire, 1950, pp. 20-21.

¹²⁷ Qāsim, *ʿAṣr salāṭīn*, p. 303; Ibn Iyās, *Badāʾiʿ al-zuhūr*, vol. III, p. 297; Ibn Duqmāq, *Kitāb al-Intiṣār*, vol. IV, pp. 114-115.

some elephants walking through the streets of the city.¹²⁸ The horses in the procession represented the Mamluk victories in battle as well as their great wealth. The animals were generally divided between two groups of marchers. The first group consisted of musicians, who opened the procession with a musical accompaniment, followed by the camels and elephants and the canopies, and behind them marched the other regiments. In the second group, the horses accompanied officers and civil officials, poets and flautists. The sultan and his guard marched at the end of the procession, sometimes preceded by four horses led by foot soldiers.¹²⁹

In Mamluk times the *Hajj* was inaugurated by festive processions that were carried out in Cairo, in which the *Dawarān al-maḥmil*, was carried around the city.¹³⁰ The *Dawarān al-maḥmil* was a canopy borne on the back of a camel, and inside it was a covering (*Kiswah*) for the *Ka'bah*, made of black cloth embroidered in golden thread with scripts from the Koran. The cloth was woven in Egypt especially for this purpose.¹³¹ The celebration had a great effect on the state of the markets in Cairo, which were full of people acquiring provisions for the pilgrimage. The canopy symbolized the preparations for the pilgrimage and the participation of all those who wanted to join the caravan setting out for Mecca. The sources mention Sultan al-Ẓāhir Baybars al-Bunduqdārī as the sultan who, in 657/1285, instituted the celebration of the *dawarān al-maḥmil* prior to the pilgrimage.¹³² This practise was abolished by Sultan al-Malik al-Ẓāhir Jaqmaq al-'Alā'ī in the month of *Dhū al-qī'dah* 855/1451, but restored by Sultan al-Ashraf 'Ināl in the month of *Rajab* 857/1453.¹³³ The procession was escorted by highly-

¹²⁸ Ibn Iyās, *Badā'i' al-zuhūr*, vol. II, pp. 274, 383.

¹²⁹ On the Mamluk sultans' processions and on their rituals and regal entrances, see Henri Bresc, "Les entrées royales des Mamlūks—Essai d'approche comparative," *Genèse de L'État moderne en Méditerranée*, Collection de L'École Française de Rome, 168 (1993), pp. 81-96. (referring to Ibn Iyās, *Badā'i' al-zuhūr*, vol. II, pp. 274 (events 1513), 383 (events 1514).

¹³⁰ On the *Maḥmil* procession, see Fr. Buhl –[J. Jomier], "Maḥmal," *E.I.*², vol. VI (1991), pp. 44-46; Hava Lazarus-Yaffe, *Chapters in the History of the Arabs and Islam*, Tel Aviv, 1967, pp. 99-101 [Hebrew]. See also Qāsim 'Abduh, *ʿAṣr salāṭīn*, pp. 296-297; Ibn Shāhīn al-Ẓāhirī, *Zubdat kashf*, p. 87; al-Suyūṭī, *Ḥusn al-muḥāḍarah*, vol. II, pp. 310-311; Ibn Ẓahīrah, *al-Faḍā'il al-bāhirah*, pp. 199-200. Figure 5 shows a *dawarān al-maḥmil* procession with camels and horses.

¹³¹ Al-Qalqashandī, *Ṣubḥ al-a'shā*, vol. IV, pp. 57-58; Ibn Ẓahīrah, *al-Faḍā'il al-bāhirah*, p. 199; al-Sakhāwī, *al-Tibr al-masbūk*, p. 201; al-Maqrīzī, *al-Dhahab al-masbūk fī dhikr man ḥajja min al-khulafā' wa al-mulūk*, pp. 43-44; al-Suyūṭī, *Ḥusn al-muḥāḍarah*, vol. I, p. 88.

¹³² Al-Maqrīzī, *al-Dhahab al-masbūk*, p. 11; al-Suyūṭī, *Ḥusn al-muḥāḍarah*, vol. I, p. 88.

¹³³ Ibn Taghrī Birdī condemns the abolition of the *dawarān al-maḥmil* procession by Sultan Jaqmaq and sees it as the abolition of a wonderful tradition that had existed in Egypt for many years. See Ibn Taghrī Birdī, *Ḥawādith al-duḥūr*, vol. II, p. 340. On the restoration

trained Mamluk soldiers, who demonstrated their skills in war games and *furūsīyah*, such as archery and fencing.¹³⁴

For three days preceding the *dawarān al-maḥmil* procession there were public announcements inviting the people to come and join in the event and watch the performance, which most of the accounts describe as unique and spectacular. The camel bearing the covering for the *Ka'bah* within the canopy was draped entirely with coloured silk cloth and wore a silver-coloured cap. The Mamluk riders who were skilled in *furūsīyah* games and the champions in various sports contests wore their finest garments and precious decorations, carried their ornamented weapons and performed *furūsīyah* games before the *maḥmil*. Various feats and games with lances while standing on horseback were another feature of this procession. As well as the Mamluks, a group of musicians marched in the procession playing trumpets and drums. Finally, the procession reached the square where the sultan sat viewing the performance and the games, and at the end he awarded gifts and medals to the riders who had shown special talent and defeated the others.

Another festival that was celebrated in Egypt with great splendor was the birthday of the Prophet, known as *al-mawlid al-nabawī al-sharīf*. During this festival they erected a huge tent in which the sultan sat surrounded by a group of emirs, facing the watching crowd and the clerics who chanted verses from the Koran and sang hymns of praise to Allah and the Prophet. At the end of the celebration sweets and candies were distributed to the crowd. The Ramadan festival is also worthy of mention, because for the entire month of Ramadan the city of Cairo was lit up all night long with candles, and the confectionery stores were open all night. It is interesting that many of the candies sold during Ramadan were shaped like animals, such as cats and lions. They were known as *ʿalālīq* (sing. *ʿallāqah*), because the storekeepers used to hang them in the store's doorway.¹³⁵

E. THE *ḤAJJ* CARAVAN

The precept of making a pilgrimage (*Ḥajj*), as one of the five main religious duties that every Muslim is required to fulfil, is deeply rooted in Muslim

of the tradition by Sultan al-Ashraf Īnāl, see Ibn Taghrī Birdī, *Ḥawādith al-duḥūr*, vol. II, p. 435.

¹³⁴ Ibn Taghrī Birdī, *Ḥawādith al-duḥūr*, vol. II, p. 435; al-Qalqashandī, *Ṣubḥ al-aʿshā*, vol. IV, pp. 57-58

¹³⁵ Qāsim, *ʿAṣr salāṭīn*, p. 291; Saʿid ʿĀshūr, *al-Muḥtamaʿ al-miṣrī*, p. 185.

society and many rulers boasted of upholding it. The pilgrimage is performed once a year and is concluded on the 10th of the month of *Dhū al-ḥijjah*. To reach the cities of Mecca and Medina the medieval pilgrims had to cross deserts and broad barren wastes. However, since in Islam, pilgrims are not required to walk, as do many Christian pilgrims to various holy sites, pack animals and riding animals had a central role in this affair. Both the Umayyad rulers, who moved their centre of administration from Mecca to Damascus, and the Abbasids, who set their capital in Baghdad, organized splendid pilgrimages, as described in the chronicles of the time.¹³⁶

Under the Mamluks, two caravans set out from the sultanate, one from Cairo and one from Damascus. The caravan from Cairo, which was the more splendid and well guarded of the two, included, besides common believers, merchants and wealthy personages, also the sultans' wives and daughters and the wives of important Mamluk emirs. Therefore, this caravan was guarded by high ranking and experienced Mamluk horsemen. The caravan from Damascus included merchants from towns in Syria—Damascus, Aleppo, Antioch, and others. This caravan was guarded by Mamluk soldiers organized by the governor of Damascus.

The pilgrimage to Mecca required a great deal of planning and organization, not only in financial terms but also in terms of preparing the animals for a long and tiring journey. In addition to the *Amīr al-maḥmil*, the caravan included people of relevant professions such as physicians, clerics, muezzins to call the people for prayer, a head *cadi* and witnesses (reliable people with a good reputation who were fit to give evidence before judges in a law court). Corpse washers also accompanied the pilgrims in this official role, for which they were paid by the state.¹³⁷ Although the names of veterinarians are not mentioned in the lists of professionals who had official roles in this journey, it may be assumed that they played a vital part in the caravan, particularly in the case of a royal caravan in which the sultan himself and some of his family took part, bringing with them many animals that belonged to the sultan and certainly needed veterinary care during the journey.

Detailed descriptions of pilgrim caravans that appear in writings of the period generally mention the numerous animals such as horses, camels, mules and donkeys. Camels had a central role in view of their physical

¹³⁶ On the precept of *Ḥajj* in Islam, see A.J. Wensinck, B. Lewis, "Ḥaḍḡj" *E.I.*², vol. III, p. 31.

¹³⁷ Qāsim, *ʿAṣr salāṭīn*, p. 297; al-Qalqashandī, *Ṣubḥ al-aʿshā*, vol. IV, pp. 57-58; Ibn Ṣāḥirah, *al-Faḍāʾil al-bāhirah*, pp. 199-200; al-Suyūṭī, *Ḥusn al-muḥāḍarah*, vol. II, pp. 310-311; Ibn Baṭṭūṭah, *Riḥlat*, pp. 42-43; Ibn al-Ḥāj, *al-Madkhal*, vol. I, pp. 266-269.

capabilities in crossing deserts, although horses and mules also carried a large part of the merchants' cargo. The mules were the favorite mounts of the women, as they were the most comfortable animals to ride, as we have remarked before.

In Mecca, on Mt. 'Arafāt a large number of sheep were slaughtered as part of the religious ritual celebrating the redemption of Ishmael and marking the end of the pilgrimage. This called for complicated logistics to bring the flocks of sheep from Egypt and Syria to Mecca. To preserve the health of the animals designated for slaughter (it is forbidden to slaughter a sick animal or one with any defect), there was need for close veterinary supervision and management of all the flocks as well as of the other animals in the caravan.

The caravan referred to as the sultan's caravan did not always include the sultan himself, but it was always more magnificent and lavish than all the *Hajj* processions organized by others. The arrangement of the sultan's caravans was of particular interest to the writers due to the participation of noblewomen, especially when these were the sultan's wives or daughters. They generally mention the wife of a certain sultan who went on a pilgrimage and wanted it to be remembered in history as the most splendid and distinguished procession, and particularly wanted to acquire the reputation of a benefactor who gave more to the poor than her predecessors had given. This covert competition for primary status became in time a common phenomenon that is mentioned in many sources.¹³⁸

Robbery and plunder by the Bedouin tribes along the *Hajj* routes were not unique to the Mamluk period and went back even before the beginning of Islamic history. However, over the years this phenomenon had become increasingly common and was also accompanied by violence and murder. Despite the efforts of many Muslim rulers to prevent these raids on the *Hajj* routes, they were not very successful in putting an end to this scourge.

Abū al-Fidā's descriptions of these pilgrimages are important because they are the personal evidence of an emir who belonged to the Mamluk elite and himself participated in many such caravans together with the sultan. Sometimes he mentions having taken part in a *Mawkib al-Hajj* trip, in 719/1319, at the sultan's invitation. To arrive in time for the procession,

¹³⁸ One example of this is Barakah Khātūn b. 'Abd Allāh, the mother of Sultan al-Ashraf Sha'bān, who went on a pilgrimage during the reign of her son (770/1368) and donated large sums of money to thousands of her companions on this journey. In memory of her donations and her many acts of charity to the poor, the people called that year "the year of the Sultan's mother" (سنة أم السلطان). Ibn Hajar al-'Asqalānī, *al-Durar al-kāminah*, vol. I, p. 475.

he had to use post horses to get to Cairo from Ḥamāt, his home in northern Syria.¹³⁹ He recalls having been on a previous pilgrimage, in 714/1314, when he was permitted to join the sultan's caravan, and notes that on that journey the sultan had allowed him to choose whether his camels would walk before or after the sultan's *maḥmil*, a gesture that testifies to his high status.¹⁴⁰

Pilgrimages in which the sultan participated personally were obviously of special grandeur. According to Abū al-Fidā, the sultan's retinue numbered over sixty Mamluk emirs, a large number by all accounts, and that was what made it one of the most magnificent processions in the Mamluk period. This chronicle contains a description of the entire journey to Mecca and back, which lasted some 25 days. The sultan supplied all the food, including sugar and sweetmeats, for the thousands of people in the procession, and for all the animals. Abū al-Fidā mentions that 4000 portions of barley were distributed daily to the pack animals. Camels were mainly used for transportation but Abū al-Fidā also had with him a horse and a mule. Besides there were 40 camels, whose special task it was to carry the *maḥāyir*, which were kinds of leather boxes planted with vegetables and herbs that they picked each day in order to serve fresh food to the sultan and his party.¹⁴¹ But above all, Abū al-Fidā describes hunting as the main occupation of the sultan throughout the entire pilgrimage, in contravention of the religious laws that forbade the hunting of animals during this holy period. He names the types of waterfowl that the sultan liked to hunt, especially cranes. Notwithstanding the sultan's preoccupation with hunting, Abū al-Fidā enthusiastically describes how he performed the religious duties associated with the *Ḥajj*.

The Caravan of the *Ḥajj* had also a great economic importance. In point of fact, this was not an innovation of the Mamluks; pilgrimages throughout the years had been accompanied by commercial trips between Mecca and the various countries from which the pilgrims came, but the Mamluks in particular fostered the practise of pilgrimage because of its importance for trade and for increasing the revenue of the state. The pilgrim routes and the trade routes connected the Arabian Peninsula with the other countries, among them the territories under Mamluk rule, and along these routes flowed the trade in spices and other goods. It was an important logistic operation for the Mamluk economy, hence its organization and manage-

¹³⁹ The journey from Ḥamāt to Cairo took him a week (In 719/1319 he left on Friday the 16th of *Shawwāl* and arrived on Saturday the 24th of that month).

¹⁴⁰ See Abū al-Fidā, *al-Mukhtaṣar*, vol. IV, p. 88.

¹⁴¹ *Ibid.*, pp. 101-102.

ment was entrusted to an important emir, known as *Amīr al-ḥajj*. This was one of the senior roles in the Mamluk hierarchy, and the emir was required to be conversant with all the pilgrim routes and with the Arab tribes that lived alongside these routes in order to ensure the safety of the caravan.¹⁴² The massive presence of Mamluk soldiers accompanying the caravan was also designed to protect the merchandise being transported in it.

F. ANIMALS IN THE POSTAL SERVICE

1. *Post Horses*

Animals were also used in the service of the postal system, and therefore played a major part in the ongoing administration of the sultanate. The term post horse (*khayl al-barīd*) appears frequently in the Mamluk sources. Shāfi' Ibn 'Alī al-'Asqalānī, in his treatise mentioned above, quotes a clear instruction from Sultan Qalāwūn, emphasizing that post horses are those that can shorten distances, swallow up the miles, provide information on things hidden and obscure, and they can also reveal government secrets. Hence, it is essential to ensure that the post-horse stations scattered throughout the sultanate are always manned by responsible people, and the ruler must keep a watchful eye on them. He adds that it is necessary to choose horses with long strides, so that they can complete the journey more quickly.¹⁴³

Explaining the origin of the word *barīd*, meaning post, al-Maqrīzī writes that an ancient Persian king was the first to use animals for delivering mail. That king, named Dārā, used animals with cropped tails, a sign that they belonged to the postal service. They were known as *barīd dhanab*, meaning crop-tailed, and the Arabs borrowed the word *barīd* from the Persian term.¹⁴⁴

According to al-Maqrīzī, the first Mamluk Sultan to organize the post road between Damascus and Cairo was al-Zāhir Baybars al-Bunduqdārī in 659/1260. This ruler established a horse post system on the advice of a learned man who told him about the postal tradition in the Caliphate

¹⁴² The biography of *Amīr al-Ḥajj* who bore this role from the year when Sultan al-Ashraf was killed (778/1376) until he died in 786, relates that he was a Mamluk who belonged to Sultan al-Nāṣir, rose in the hierarchy until he was appointed *Amīr Ṭablkhānāh* (responsible for the military band) during the reign of Sultan al-Nāṣir Ḥasan, and was promoted to the role of *Amīr al-Ḥajj*. The biography states that he was very familiar with the Hejaz routes and with the Arab tribes that lived alongside them. See Ibn Ḥajar al-'Asqalānī, *al-Durar al-kāminah*, vol. I, p. 496.

¹⁴³ Shāfi' al-'Asqalānī, *al-Faḍl al-ma'thūr*, pp. 132-133.

¹⁴⁴ Al-Maqrīzī, *al-Khiṭaṭ*, vol. I, p. 366.

period and perhaps also about the Mongolian postal system.¹⁴⁵ At first, the system was characterized by improvisation and a lack of professional workers, but at the beginning of the 14th century it improved significantly due to the methodical efforts of the state secretaries, Banū Faql Alla, who built new post stations, renovated the old ones and improved the road network. They also made the system profitable by integrating postal delivery with commerce. Baybars invested huge sums in enhancing the postal system to ensure that it would work in an orderly fashion and messages from Damascus would reach him in Cairo every four days, supplying him with information concerning events in his sultanate twice weekly. At every station along the route from Damascus to his castle in Cairo there were dozens of horses. The chroniclers do not state the exact number of horses at each station,¹⁴⁶ but they mention the two people who worked with the horses at every station. The *sayyās* was responsible for the care of the horses, including their training, grooming and feeding, and the *sawwāq* was the one who took the horses from one station to another. Horses were taken from station to station not only to deliver mail but also for transportation purposes; however, only a person who received a royal order with the sultan's seal was permitted to use the post horses. The *sawwāq*'s job was to lead the rider and serve him all along the way until he arrived at his destination.¹⁴⁷ All the horses in the postal service were the property of the sultan, and every place where there was a postal station was annexed by the sultan and came under his personal supervision, even in regions that were controlled by governors on his behalf. Sometimes the postal service could not operate twice a week as planned, due to the lack of horses. Sultan Baybars is credited by the sources as having revived and restored the postal system after making some surprise visits in 667/1269 to various post stations in his sultanate and seeing their poor condition.¹⁴⁸

¹⁴⁵ On the rehabilitation of the postal system by Baybars, see al-Maqrīzī, *al-Khiṭaṭ*, vol. I, pp. 366-367; J. Sauvaget, *La Post aux chevaux dans l'empire des Mamelouk*, Librairie d'Amérique et d'Orient Adrien-Maisonneuve, Paris, 1949, p. 85; Adam J. Silverstein, *Postal Systems in the Pre-Modern Islamic World*, Cambridge: Cambridge University Press, 2007, pp. 165-185. Al-Jāhīz in his book on mules, describes the state of the postal system in the period of the Abbasid Caliph al-Ma'mūn. He writes that this ruler examined the reason for the flaws in the postal system, and found that the cause was the unsatisfactory care of the mules that worked in the postal service, particularly the inadequate supply of food. See 'Amrū b. Baḥr al-Jāhīz, *Kitāb al-Qawl fī al-bighāl*, ed. Charles Pellat, Beirut: Dār al-Jil, 1995, pp. 54-55.

¹⁴⁶ However, there is a misleading passage in the book by Ibn Taghārī Birdī concerning the number of horses in the post stations. See Sauvaget, *La Poste*, p. 34 (note 146).

¹⁴⁷ Al-Maqrīzī, *al-Khiṭaṭ*, vol. I, p. 367; Sauvaget, *La Poste*, p. 21.

¹⁴⁸ Sauvaget, *La Poste*, p. 21.

During Baybars' period, Arab and Turkoman tribes supplied the horses to the post stations in the region of Syria every month in exchange for the use of land. Sauvaget gives the example that from Balbas to Za'qah the runners found horses supplied by the Arabs in exchange for lands. At the beginning of every month the Arabs whose turn it was to provide horses went to the station, and at the end of the month the horses were replaced by those whose turn came round next. This service was called *khayl al-mushāharah*—"horses that supply a monthly service until they are replaced." If the Arabs brought horses that had already served, i.e., were not new, they were not accepted because the Arabs did not give them enough food.

The Damascus–Cairo post road in the *Bahṛī* Mamluk period is generally described as a safe and well organized route, with all the stations staffed by men and horses and with food supply stations for the people and the animals.¹⁴⁹ The post station included a small building with a few rooms for the postal staff to sleep in.¹⁵⁰

The biographies of officials in the Mamluk ruling system mention the fact that they traveled from place to place by post horse, especially when they needed to get quickly from Syria to Cairo. These were mostly people in administrative positions, emirs, governors of districts, military commanders and others who were summoned urgently to the sultan's presence. Some sources note that physicians, too, were allowed to travel by post horse in order to reach the capital quickly and tend to sick people in the court or to the sultan when he was ill.¹⁵¹

Swift transport, mainly from Syria to Egypt, and also to other places such as Ḥijāz or North Africa, was important for the administration of the sultanate and the control of all its areas. The messengers changed horses at various stations and went on their way with fresh horses, thus saving time

¹⁴⁹ Sauvaget quotes this from the treatise of al-'Umārī, *al-Ta'rif bi al-muṣṭalaḥ al-sharīf*, Cairo, 1312 H. See Sauvaget, *La Poste*, p. 22 (note 100).

¹⁵⁰ The postal system also made use of the khans, especially for large animals such as camels carrying loads for the sultan or for one of the senior emirs. While the post stations all belonged to the state and were under the supervision of the sultan or an official of the postal system, and the employees received their salaries from the state treasury, the khan was a private venture of individuals, designed for the use of traders and passing travelers. Sauvaget, *La Poste* p. 39.

¹⁵¹ The sources cite several examples illustrating how long it took to reach Cairo from Damascus via the postal system. Generally, it took a week, but it could be done in three days if they did not stop on the way. These examples show how post horses were used for important missions or for the ruler to arrive swiftly and safely. For example, they mention Sultan Baybars, who traveled from Damascus to Cairo by post horse, and also his son, who traveled to Cairo in the same way. See Sauvaget, *La Poste*, p. 36 (note 145).

without overtiring the horses. This efficient arrangement also enhanced the security of the travelers, and some of the sources state that, thanks to the post stations, even women could travel alone between Cairo and Syria riding horses or other pack animals, or on foot. In 803/1400, following the invasion of Damascus by the Mongolian ruler, Tamerlane, the postal system was destroyed and the many post stations along the Damascus–Cairo road were abandoned and fell into disrepair. This derelict state continued during the period of al-Maqrīzī's descriptions of the region in 818/1415, as he states explicitly.¹⁵²

While pigeons were used mainly for carrying information in short messages, which included state secrets connected with security, such as insurgence and revolt, attempted coups, opposition to the ruler, plots and suchlike situations that were not uncommon during the Mamluk period, the post horses were used to carry messages such as decrees and detailed letters from the sultan to the governors and *vice versa*. Unlike pigeons, the horses could also carry heavy loads. For example, there is an account of snow being brought from Damascus to Cairo by post horses.¹⁵³

Abū al-Fidā notes that in 718/1318 he traveled from Hama in Syria to Cairo in Egypt with horses designated for the sultan. He writes that a certain delay in Hama forced him to continue his journey riding post horses in order to make up for the delay and catch up with the horses which had gone ahead and already reached Gaza. He gives many details, including the exact time of the ride from one station to another. The purpose of his journey to Cairo was to attend an official meeting with the sultan in order to hand over the horses and receive in exchange an official appointment as governor of Aleppo as well as various gifts, including food and hay for the herds, bread, sugar, barley, and so forth. The most expensive gift he received, and one that testified to his closeness to the sultan, was a horse equipped with a saddle embroidered in gold.¹⁵⁴

Post horses were used for official tasks in the service of the sultan, but sometimes they were also used by other high-ranking personages. As mentioned above, a Mamluk who wanted to use post horses had to receive official permission from the sultan. Nevertheless, there were emirs who exploited the postal system for their personal needs and used the post

¹⁵² Al-Maqrīzī, *al-Khiṭaṭ*, vol. I, p. 367.

¹⁵³ This system was affiliated to the postal system (*al-barīd*) from the time of al-Nāṣir Muḥammad (from 710/1310). Both the post and the snow carrying camels were in the personal service of the sultan. See Sauvaget, *La Poste*, pp. 77–78.

¹⁵⁴ Abū al-Fidā, *al-Mukhtaṣar*, vol. IV, pp. 98–99.

horses to carry goods from place to place, in violation of the laws determined by the sultan. Al-Maqrīzī mentions the emir Şurghatmish al-Nāşirī, who was appointed to head the royal guard, *ra'īs nawbah*, and was also responsible for managing the endowments (*awqāf*), in addition to his role as head of the postal system.¹⁵⁵ According to al-Maqrīzī, this emir ruled with a rod of iron and brought order to both the systems. During his administration of the postal service no Mamluk dared to use post horses without permission in his handwriting. He even made the rules for using post horses more stringent and forbade those who did receive permission to carry with them cloths or money,¹⁵⁶ setting severe punishments for those who dared to break the rules and transport personal items. Al-Maqrīzī relates that the order that this emir sought to impose on the postal services involved one of the severest struggles in the Mamluk regime and testifies to the importance of the post in this period.

2. Postal Pigeons

During the Mamluk period the organization of the postal pigeons was subordinate to the post horse system. These homing pigeons, described in the sources as *al-ḥamām al-rasā'ilī*, were commonly used for carrying official mail to all corners of the sultanate. Youssef Ragheb, in his book on postal pigeons in Islamic countries, claims that this postal system reached its peak in the Mamluk period, remarking that no society ascribed such value to the postal pigeons as the Mamluks.¹⁵⁷ The importance of the pigeons is expressed in official correspondence, orders and instructions from the sultan to those in charge of the postal system on how to operate it.¹⁵⁸

Two factors determined the success of the postal system: speed and secrecy. Speed was of vital importance in order to avert danger, for example, in situations of impending war, when there was a need for pre-emptive action.¹⁵⁹ It was no less important to ensure the secrecy of the

¹⁵⁵ Al-Maqrīzī, *al-Khiṭaṭ*, vol. IV, pp. 257-258.

¹⁵⁶ *Ibid.*, p. 258.

¹⁵⁷ Youssef Ragheb, *Les messagers volants en terre d'Islam*, CNRS Editions, Paris, 2002, pp. 29, 39-49.

¹⁵⁸ Al-Maqrīzī's essay *al-Khiṭaṭ* also contains a detailed description of the Mamluk pigeon post system. See al-Maqrīzī, *al-Khiṭaṭ*, vol. II, p. 231; al-Suyūṭī, *Ḥusn al-muḥāḍara*, vol. II, pp. 313-319; Ibn Shāhin al-Ẓāhirī, *Zubdat kashf*, pp. 116-117.

¹⁵⁹ In referring to Sultan Qalāwūn's victory over the Mongols in 680/1281, many writers emphasize the exchange of letters via postal pigeons. For instance, they write that while he was on his way to do battle with the Mongolian army in Syria he received messages from the town of Tripoli. The pigeons were sent from Ḥiṣn al-Akrād. The sultan in turn sent a message by pigeon post to the soldiers who were in the fortress at the time and ordered

messages. Shāfi' Ibn 'Alī al-'Asqalānī (14th century), who served in the court of Sultan Qalāwūn and wrote his biography,¹⁶⁰ cites several examples of correspondence and instructions that he wrote himself, in his role of the sultan's official letter writer.¹⁶¹ In one of this letters which was sent by Sultan Qalāwūn from Damascus to his son who was replacing him in Cairo, the sultan ordered his son to make sure to use the regular postal pigeons,¹⁶² adding that he must choose the pigeons that excel in performing this task. He also mentions the destination to which the pigeons must be sent, specifying the post station in Gaza as the station to be reached by pigeons sent from Egypt. From there the message was sent on the same day to Damascus, or to other post stations as necessary.¹⁶³ In this letter we also learn of postal pigeons that the Mamluks bred in strategic areas and those at the borders of their territory. Shāfi' al-'Asqalānī lists the places where pigeon post stations were set, the destination that the pigeons reached from each station, and the rules instructing the Mamluk soldiers responsible for the stations to guard the place carefully. He adds: "It is the duty of those responsible for these stations to catch every pigeon that passes and not just one pigeon carrying a note with a message."¹⁶⁴ The same author's attitude to this official letter and his emphasis on the parts related to postal pigeons indicate the importance of this subject to the sultan, who

them to remain inside. In the end, Qalāwūn won a great victory over the Mongols due to his correspondence with the other Mamluks in different places, which was possible only by pigeon post. Shāfi' al-'Asqalānī, *al-Faḍl al-ma'thūr*, pp. 73-74.

¹⁶⁰ Shāfi' al-'Asqalānī, *al-Faḍl al-ma'thūr*, pp. 119-125.

¹⁶¹ Shāfi' al-'Asqalānī mentions several times in this book that he was the sultan's official letter writer. He also provides interesting information about the group of clerks who held this role, from which we learn that it was a family business and the person in charge of them, and perhaps also the one who taught them the secrets of the profession, was one of the uncles of the writer, who was officially responsible for the sultan's correspondence (صاحب ديوان المكاتبات). e. g. *Ibid.*, pp. 51, 52, 60, 61.

¹⁶² The term he uses is *al-ḥamām al-rasā'ilī*, meaning the pigeons that carry the letters. *Ibid.*, p. 120.

¹⁶³ Al-Maqrīzī cites a book by Ibn 'Abd al-Zāhir (d. 629/1292), *Tamā'im al-ḥamā'im*, who counted in the fortress 1900 postal pigeons that served the Mamluk sultans. There were people in charge of them. Another place where pigeons were kept was Barqīyah, outside Cairo, which was known as the columbarium of Fayyūm. See al-Maqrīzī, *al-Khiṭaṭ*, vol. III, pp. 375-377. See also Shāfi' al-'Asqalānī, *al-Faḍl al-ma'thūr*, p. 120.

¹⁶⁴ Among the stations mentioned in this letter are those of Karak and Gaza, where special attention must be paid to guarding the pigeons that arrive. Other stations mentioned are those on the distant borders, where there were not even populated areas, such as the stations in Suwais, Iṭfīḥ, Sharūnah and Bahnasā. See Shāfi' al-'Asqalānī, *al-Faḍl al-ma'thūr*, p. 121.

saw the organization of the pigeon post system as a major factor in his administrative apparatus.

It was not only messages containing state secrets and political or military messages that Qalāwūn expected to receive via the postal pigeons from his son in Cairo. He also asked his clerks to report to him and add to each message information about the rising of the Nile, as well as details of the current prices of the crops in Egypt's markets.¹⁶⁵ Qalāwūn also expected reports on the water system, and explained the importance of maintaining the various bridges and aqueducts along the Nile in good condition, because they served to guard the water level of the Nile during the flooding and to regulate the flow of water to cultivated areas. In his instructions Qalāwūn emphasized the necessity of organizing the postal pigeons in every place where there was a bridge, especially near bridges and canals where there had been problems in the past. The postal pigeons in the vicinity were expected to deliver information in the case of a deluge, the collapse of a bridge, the destruction of a major canal or flooding, so that workers could be sent to repair the damage without delay.¹⁶⁶

Mamluk sultans were not only the heads of the government hierarchy but were also responsible for the military command system when they went into battle. Every piece of vital information describing a local battle, revolt, plot, or suspicious movement of a hostile army required his officials to send a message by postal pigeon informing the sultan of events.¹⁶⁷

Shāfi' Ibn 'Alī al-'Asqalānī's treatise contains descriptions that bring out the importance of the notes sent via postal pigeons during crisis situations, asking for support and help. The messages were tied to the pigeons' tails or hidden underneath their wings. Sometimes, these messages resolved a battle, guaranteed a victory, or helped to crush a revolt. One such instance is described in which a group of Mamluk rebels laid siege to the Cairo Castle (*Qal'ah*) and many Mamluk emirs who remained loyal to the ruler were imprisoned in the castle compound. The sultan was away at the time, and the only way to inform him of the threat to his throne and his life was by postal pigeons that had been raised in the castle. The message reached its destination, and he returned at once and helped to suppress the revolt. In

¹⁶⁵ *Ibid.*, p. 118.

¹⁶⁶ Referring to the canals, he mentions the engineers and the supervisors of the orchards and gardens or the farmers. He writes that bridges, water wheels or canals should only be opened at the appropriate time when water would flow from the aqueduct. The people responsible for deciding on this matter were the experts, i.e., the engineers and agricultural supervisors (والشهادة على الخولة والمهندسين). *Ibid.*, p. 124.

¹⁶⁷ *Ibid.*, p. 42.

this situation, the pigeons were the only means of summoning help and rescuing the captives.¹⁶⁸

The pigeons' efficient performance of their task also depended on their ability to avoid being seen by the enemy; for this they were trained to act in diverse situations. Sometimes postal pigeons brought messages of victory or defeat, which were transmitted by agreed signs. In one such case, the citizens of Damascus were gripped by fear and panic at the sight of a group of Mamluk emirs and soldiers fleeing to the city from a battle with the Mongols that was raging nearby. This group of emirs, which was responsible for the left flank of the Mamluk army, was defeated as soon as the battle started, while the other flanks of the army were victorious, unknown to those fleeing to the city. The citizens of Damascus feared for their lives because they understood that the Mongols were winning. In order to pacify the citizens and inform them of what was happening on the battlefield, the sultan ordered the immediate dispatch of sheets of blank paper dipped in saffron. This was an agreed sign in the Mamluk pigeon post signifying victory in war.¹⁶⁹

The operation of the pigeon post system necessitated not just clerks whose job it was to write the letters but also experts in the treatment of birds, since these birds were highly susceptible to illness and any injury to them might cause the entire system to collapse. The pigeons were kept in cotes in the post station compound, in the same stations where the post horses were kept, apparently situated on a high balcony above the entrance. The keepers of the pigeons lived together with the keepers of the horses. The keepers of the pigeons were called *barrājah* (sing. *barrāj*), from the word *burj*, meaning a tower or a pigeon cote. Keepers of a lower rank were also employed in these compounds; they were known as *khuddām*, meaning servants.¹⁷⁰

There were also some disadvantages to the use of postal pigeons, mainly due to the impossibility of sending them out at night or in stormy weather. Some of them also got lost or fell into the wrong hands. Despite these disadvantages, the pigeons were treated with devotion and they were so important that the sultan stopped whatever he was doing when a message was brought to him by a postal pigeon.

According to Sauvaget, in the second half of the fourteenth century disorder began to appear in the system, and ongoing neglect led in the end

¹⁶⁸ *Ibid.*, pp. 47-49.

¹⁶⁹ *Ibid.*, p. 77.

¹⁷⁰ Sauvaget, *La Post*, p. 39; Ibn Shāhīn al-Zāhirī, *Zubdat kashf*, p. 117.

to deterioration of the entire system. Sauvaget is of the opinion that during the Circassian (*Burjī*) period (1382-1517) there were serious flaws in the functioning of the stations, and from 825/1421 the postal system in fact ceased to exist as an organized body functioning regularly.¹⁷¹ On the other hand, there is considerable evidence to rebut this argument, particularly the descriptions of western travelers to Egypt, who were highly impressed by the postal system, especially the pigeons. Meshulam of Volterra, for example, describes in the 1481 the regular dispatch of postal pigeons from the governor of Alexandria to Cairo, reporting to the sultan on events in his city, including information on the merchants who came to the port.¹⁷²

G. TRADE IN ANIMALS AND GIFTS

The prestige of a Mamluk was measured by the number of horses he possessed. This is borne out by the appellations denoting the military roles he had held, such as “emir of a thousand,” “emir of a hundred,” and “emir of ten,” each grade indicating the number of soldiers under his command, and hence also the number of horses.¹⁷³ The Mamluks’ expansion of the territories under their control and their success in keeping these territories for several centuries were based more on their warhorses than on their human resources, which were relatively limited. They retained their military power largely due to the fact that many sultans imported, bred, and took good care of the horses in their stables.

The acquisition of horses was therefore a foremost preoccupation of Mamluk Sultans. For example, many of the chroniclers mention that Sultan al-Nāṣir Muḥammad Ibn Qalāwūn made a point of acquiring a large number of horses from all corners of the sultanate, especially pedigreed horses, for which he paid vast sums, and they tell of one tribe that became rich in this way. Members of the tribe scouted the Arabian peninsula for thor-

¹⁷¹ Sauvaget, *La Poste*, p. 86.

¹⁷² Rabbi Meshullam son of Menahem of Volterra (1481) writes about postal pigeons that were sent from Alexandria to Cairo: “The Admiral [of Alexandria] has a pigeon and, whenever he wishes to send a message to the Sultan, he places it in the pigeon’s mouth or fastenes the letter to it. The pigeon takes it to the window of the Sultan’s house in Cairo, where there is always a man on the look out. This is really the truth and there is no doubt about it.” See *Travel of Meshulam of Volterra to the Land of Israel* (1481), ed. Avraham Yaari, Jerusalem: Mossad Bialik, 1948, p. 49 [Hebrew]. Adler’s English translation is inaccurate; see Adler (ed.), *Jewish travelers*, p. 162.

¹⁷³ Al-Maqrīzī, *al-Khiṭaṭ*, vol. III, pp. 350-356; Ibn Shāhīn al-Zāhirī, *Zubdat kashf*, pp. 111-113; al-Suyūṭī, *Ḥusn al-muḥādarah*, vol. II, pp. 129-134.

oughbred horses in order to sell to the sultan.¹⁷⁴ These thoroughbred horses, which even procreated in the sultan's court, were also intended for distribution to the Mamluks who served under him. The pedigree of the horses they received was another indication of their status. Along with the horse, they were given all the tackle that was necessary for riding and fighting on horseback, such as the bridle, reins and saddle. Abū al-Fidā' often mentions the gifts that he himself received directly from the Mamluk sultan, emphasizing that the sultan sent him horses of the purest breeds in his stables, in token of his belonging to the ruling Mamluk elite. He further mentions that the sultan presented him with a Barqī horse, the most esteemed gift that an emir or a local governor received from the sultan.¹⁷⁵

The horses that the Mamluks received from the sultan were used in his service in warfare, but he also gave them other animals as a gesture of appreciation and affection, and perhaps in order to ensure their loyalty. These gifts were usually hunting birds such as falcons and hawks. Abū al-Fidā' tells of such a gift that he received from Sultan al-Nāṣir Muḥammad Ibn Qalāwūn in the year 728/1327, which included a large number of falcons and hawks of different kinds.¹⁷⁶ To replenish his supply of gifts, the ruler had to purchase them from merchants who came from abroad.

Sultan al-Nāṣir Muḥammad b. Qalāwūn, who earned wide repute as a hunting enthusiast, is reported to have spent large sums of money on expensive falcons, which were imported especially for him from distant places such as Armenia and even Scandinavia. The gyrfalcons were shipped to Cairo by Venetian merchants who knew of the Mamluk sultan's fondness for certain kinds of hunting birds. One document refers to his purchase of 419 falcons, 107 of them from one Venetian merchant. The overall price

¹⁷⁴ Al-Maqrīzī, *al-Khiṭaṭ*, vol. III, pp. 365-366; al-Maqrīzī, *al-Sulūk*, vol. II/1, p. 526; Ibn Taghrī Birdī, *al-Nujūm*, vol. IX, p. 167; Ibn Duqmāq, *al-Jawhar al-thamīn*, pp. 365-366 (Ṭab'at Jāmi'at Umm al-Qurā, 1982).

¹⁷⁵ A Barqī horse—from the Burqa, a desert region west of Alexandria, was a gift that the Mamluk sultan regularly gave to the highest ranking emirs and those who were governors and kings throughout the sultanate. Abū al-Fidā' remarks that he received a Barqī horse from the sultan every year as a token of appreciation. Sometimes the sultan even sent two Barqī horses, one for him and one for his son, indicating that the son, too, was considered one of the senior Mamluks and perhaps would be his father's heir. The gift of the Barqī horse also included all the equipment of the highest quality, with the saddle inlaid with gold. See, for example, Abū al-Fidā', *al-Mukhtaṣar*, vol. IV, pp. 97-115. It is worth noting that Abū al-Fidā', as governor of Hamat, also sent the sultan a kind of annual tax, including a number of horses, in addition to the taxes collected from the inhabitants of the area he governed. Abū al-Fidā', *al-Mukhtaṣar*, vol. IV, p. 115.

¹⁷⁶ Abū al-Fidā', *al-Mukhtaṣar*, vol. IV, p. 115.

paid by the sultan was 300,000 dirham; hence an average price of 750 dirhams for each falcon,¹⁷⁷ about three times the cost of a mule and more than the price of a medium quality horse.¹⁷⁸

Such expensive hunting birds were also brought as gifts to the Mamluk sultanate, but it seems that gifts could also simply constitute a gratification of a request by a Mamluk dignitary who was avid to receive these rare and precious status symbols. Thus, the Venetian ambassadors who were in Egypt in 1366 were constrained to gratify the emir Yalbughā who had asked to be presented with gyrfalcons (*ciffalachos*) "for his consolation."¹⁷⁹

The price of gyrfalcons was among the highest of all types of falcons and hunting birds. The cost of shipping, feeding and individual care of each falcon during its long voyage from the Arctic region until its safe arrival in Egypt was considerable. In addition to the sea voyage, there were two overland journeys, one bringing the falcons from northern Europe to Venice or one of its ports, and the second from Alexandria to Cairo, overland or down the Nile. During all these journeys these birds had to be daily provided with the meat of birds or other animals that were slaughtered just before being fed to them. This called for complicated logistics.

Animals were sent to the Mamluks in Egypt not only from the West; the chronicles describe many gifts sent to the sultans by other Muslim rulers, who sought to cement relationships with them. These gifts were not only expensive in financial terms; in the case of horses, for example, their value was doubled because of the part they played in keeping the recipient in power. Giving horses to emirs who served under the sultan became one of the major factors in securing their loyalty. Sometimes, such a gift of horses and beasts of burden arrived in Egypt at a critical moment and actually saved a situation of chaos and rebellion, particularly when there were insufficient horses. Abū al-Fidā mentions the case of a Mamluk sultan who received an expensive gift of horses and mules. He writes that there were

¹⁷⁷ Abū Bakr 'Abd Allāh b. Aybak al-Dawādārī, *al-Durr al-fākhir fī sīrat al-Malik al-Nāṣir wa-huwa al-juz' al-tāsi' min ḥawliyyātaḥu: kanz al-durar wa-jāmi' al-ghurar*, ed. Hans R. Roemer, Cairo: al-Ma'had al-Almānī li-al-Āthār, 1379/1960, p. 294.

¹⁷⁸ The prices of horses, mules, donkeys and slaves appear in various documents, including sales contracts that are extant from the late Mamluk period. The price of a mule was approximately 257 dirham. A horse cost between 20 and 50 dinars, according to its pedigree and physical attributes. (20 dinars = 500 dirham). See Āmāl al-'Umarī, "Dirāsah li-ba'd wathā'iq tata'allaq bi-bay' wa-shirā' khuyūl min al-'aṣr al-mamlūkī," *Majalat ma'had al-makhṭū'āt al-'arabīyah*, X/2 (Rajab 1384/nov. 1964), pp. 223-249.

¹⁷⁹ L. de Mas Latrie, *Histoire de l'île de Chypre sous le règne des princes de la maison de Lusignan*, Paris, 1852, vol. II, p. 285.

close to five hundred horses, with elaborate saddles and bridles.¹⁸⁰ This huge number of horses was necessary for the ruler, particularly in light of the fact that a severe epidemic had broken out in the previous year (703/1303), causing the death of most of the horses possessed by the Mamluk emirs and soldiers.¹⁸¹ The sultan was in desperate need of horses and mules for use in battle, and the gift, from Abū Yaʿqūb Yūsuf, the ruler of Morocco, early in 704 H/1304, was of great value to the sultan. Although Abū al-Fidā does not state that the sultan had asked for these horses and mules, the sequence of events and the fact that the gift arrived immediately after the plague appears to suggest that this was a diplomatic arrangement between two rulers, and perhaps even an explicit demand on the part of the Mamluk sultan. Another gift that arrived in the same year was from the king of Dunqulah,¹⁸² in Sudan, who asked the sultan in exchange to help him restore order in his country. This gift consisted of slaves, dates, fragrant herbs, spices and fruit, and also a large number of non-thoroughbred horses. In this case, too, the gift was sent to the sultan after the death of many of his horses in a plague. The Mamluk sultan acceded to the Dunqulah king's request and sent one of his senior emirs with a troop of soldiers to help in restoring order.¹⁸³

Another occasion for exchanging gifts occurred when emirs and governors of various regions planned to revolt against the Mamluks and sought help from foreign rulers. An example of this that appears in the historical sources concerns the emir Muhannā b. ʿĪsā— the ruler of a desert region who revolted against the Mamluk regime. He appealed to the Mongolian (Tatar) ruler Abū Saʿīd for help in his war against the Mamluks, accompanying his request with a gift of 700 camels, 70 horses and a number of cheetahs.¹⁸⁴

In 703/1303, al-Malik al-Nāṣir b. Qalāwūn received a gift of falcons from a wealthy Genovese merchant named Sakrān al-Janawī. The records state that this Sakrān, in the year 711/1311, attempted to intervene for the release of Mamluk ambassadors who had been arrested together with Mongolian

¹⁸⁰ Abū al-Fidā, *al-Mukhtaṣar*, vol. IV, p. 65.

¹⁸¹ *Ibid.*, p. 64.

¹⁸² Dunqula is a town located today in northern Sudan on the banks of the Nile. It was the capital of the Christian Dunqulah kingdom. Its important products to this day are dates and certain types of leather. "Dunqulah," *al-Munjid fī al-aʿlām*, Beirut: Dār al-Mashriq, 1987, p. 246.

¹⁸³ Abū al-Fidā, *al-Mukhtaṣar*, vol. IV, p. 65.

¹⁸⁴ *Ibid.*, p. 106.

ambassadors and sent to Kos in Greece.¹⁸⁵ The merchant's intervention for the ambassadors' release indicates his high status among the Mamluks, which is also reflected in the gifts he gave to the Mamluk sultan.

Positive relations began to develop between the Mamluks and the Mongols, promoted by the diplomatic endeavors of Abū Saʿīd's vizier, 'Alī Shāh,¹⁸⁶ and oiled by exchanges of expensive gifts, including animals. Many chronicles mention gifts exchanged between Abu Saʿīd and the Mamluk sultan, with descriptions of all the items. For example, Abū al-Fidā describes gifts sent by Abū Saʿīd in 724/1323, including three mules with golden saddles inlaid with precious stones, made in Egypt, three jars of pure gold set with precious stones, a golden sword, described as unique, also set with precious stones, and silken cloths interwoven with golden thread, and eleven *bukhtī* mules draped with expensive cloth. This was not just a matter of beasts of burden carrying chests packed with hand-woven Mongolian cloths; these were mules of a special kind.¹⁸⁷

Contacts with foreign rulers, or even with important figures within the Mamluk sultanate, were normally accompanied by the exchange of gifts, of which animals, including exotic ones, were often an important part. For example, in 1263, according to the chronicler Ibn al-Dawādārī, Sultan Baybars sent to Berke, *khan* of the Golden Horde, among other presents, elephants, giraffes, monkeys, Arabian stallions, wild spotted asses from Yemen, Egyptian asses and white racing camels. Another chronicler adds to this list rare Nubian camels, Arabian racing steeds and fabulous trained mon-

¹⁸⁵ Ibn Abī'l-Fada'il Mufaddal, *Histoire des sultans mamluks: Moufazzal ibn Abil-Fazail*, texte arabe publié et traduit en français par E. Blochet, Paris, 1916-1927, p. 199; Karl V. Zetterstéen (ed.), *Beiträge zur Geschichte der Mamlukensultane in den Jahren 690-741 der Hira, nach arabischen Handschriften*, Leiden: E.J. Brill, 1919, pp. 129-130; Mohamed Tahar Mansouri, "Les communautés marchandes occidentales dans L'espace mamlouk (XIIIe—XVe siècle)," *Coloniser ou Moyen Age*, ed. M. Balard, A. Ducellier, Paris, 1995, p. 99.

¹⁸⁶ Abū al-Fidā, *al-Mukhtaṣar*, vol. IV, pp. 110, 114-115.

¹⁸⁷ These cloths, which numbered 700 bolts, had the name and title of the Mamluk sultan woven on them with golden thread. In order to receive the delegation with due dignity and respect, the sultan ordered all the Mamluks in his court to dress in their finery. In exchange for these gifts, the sultan had to repay the generosity with innumerable gifts to the members of the Mongolian delegation which was visiting Egypt for the first time. Because it was their first visit, they asked to stay in Cairo and observe the customs and the festivities that were about to begin in celebration of the festival of *al-Aḏḥā*. These festivals left a powerful impression on them. See Abū al-Fidā, *al-Mukhtaṣar*, vol. IV, pp. 109-110. Sultan al-Malik al-Nāṣir b. Qalāwūn's rise to the throne for the third time is described as an occasion of great joy that was celebrated with a procession and festivities both in Damascus and in Cairo. See Ibn Aybak al-Dawādār, *al-Durr al-fākhir*, pp. 167-185 (events 710 H).

keys (*nasānīs*).¹⁸⁸ Ibn al-Dawādārī also describes a gift sent to the Mamluk sultan by the ruler of Yemen; it included a small elephant, two tigers, four cheetahs, and a large number of horses.¹⁸⁹ Among the gifts sent to the Mamluk sultan by the Ilkhans in the early fourteenth-century we find Bactrian camels, Anatolian horses, cheetahs and falcons.¹⁹⁰ In 774/1372, the emir Manjak, governor of Damascus (*Nā'ib al-Shām*), arrived in Cairo with numerous animals to be presented to the sultan, including two lions, a hyena, a stag, 48 saluki dogs as well as many camels and dromedaries.¹⁹¹ In 795/1393 the Mamluk sultan received an elephant, a giraffe, lions, and other wild animals that were sent as a gift by the ruler of the Dahlak archipelago (in the Red Sea, near Massawa).¹⁹² Obviously, gifts that included animals, especially exotic ones, were greatly appreciated in the sultan's court.

H. MENAGERIES

Where did the Mamluk sultans keep such rare and exotic animals that reached their court from various places, or were intended to be sent as gifts to other potentates? Menageries were quite common in the Muslim world as far back as the Umayyad period.¹⁹³ Some of the Abbasid Caliphs liked to spend their leisure time in the palace gardens, which in many cases contained exotic animals that they had received as gifts from other rulers. Some sources, particularly the literature on gifts,¹⁹⁴ describe these animals, especially the exotic ones that were brought to the Caliphs' court in

¹⁸⁸ Donald P. Little, "Diplomatic Missions and Gifts Exchanged by Mamluks and Ilkhans," *Beyond the Legacy of Genghis Khan*, ed. Linda Komaroff, Leiden: Brill, 2006, pp. 41-42.

¹⁸⁹ Ibn Aybak al-Dawādārī, *al-Durr al-fākhir*, p. 217.

¹⁹⁰ Little, "Diplomatic Missions," p. 39.

¹⁹¹ Al-Maqrīzī, *al-Sulūk*, vol. III (1), p. 203.

¹⁹² Ibn Duqmāq, *al-Jawhar al-thamīn*, p. 487; al-Maqrīzī, *al-Sulūk*, vol. III (2), p. 787.

¹⁹³ Al-Maqrīzī describes at length the orchards, the gardens, the hunting grounds and the stables of various Egyptian rulers that were designed for keeping animals, including exotic ones. Notable among these are the elephant watering area from the Abbasid period, the garden of Kāfūr al-Ikhshīdī, the stables of Sultan al-Nāṣir Muḥammad Ibn Qalāwūn, a pool for predatory animals, and even an orchard called *al-Ma'shūq* that was made by the vizier al-Ṣāḥib Taj al-Dīn, a writer of veterinary books who will be discussed later. Al-Maqrīzī, *al-Khiṭaṭ*, vol. III, pp. 39-40, 78, 263; al-Maqrīzī, *al-Sulūk*, vol. II, pp. 515, 749.

¹⁹⁴ Aḥmad b. 'Alī b. al-Rashīd Ibn al-Zubayr al-Qāḍī, *Kitāb al-Dhakhā'ir wa al-tuḥaf*, ed. Mḥammad Ḥamīd Allāh, Kuwait: Dā'irat al-Maṭbū'āt wa'l-Nashr, 1959, pp. 29, 30, 37, 49, 66, 76; Abū Bakr Muḥammad wa-Abī 'Uthmān Sa'īd Ibnay Ḥāshim al-Khalīdiyyīn, *Kitāb al-Tuḥaf wa al-hadāyā*, ed. Sāmī al-Dahhān, Cairo: Dār al-Ma'ārif, 1956, pp. 14, 162, 167, 168, 254-255.

Baghdad from Africa, India and other places, and were allotted a special place in the palace gardens. However, unlike the modern zoo, the Abbasid menageries were the property of the sultan, situated in the grounds of the royal palace, and they housed the sultan's private collection of animals.

In his well-known description of Cairo, al-Maqrīzī, one of the most important writers of the Mamluk period, includes several detailed description of wild or exotic animals kept in Cairo/Fuṣṭāṭ by former rulers of Egypt. A famous menagerie described by him is the one that belonged to the Fāṭimid Caliphs. He refers to the number of exotic animals in this menagerie as matchless.¹⁹⁵ But the most detailed description of such a menagerie appear in his account of the ninth-century Ṭūlūnid ruler, Khumārawayh (884-896), whose menagerie was considered, according to this writer, as the richest and most exceptional, thanks to this ruler's keen interest in animals, which were kept in the private courtyard adjacent to his palace in al-Mīdān. Al-Maqrīzī devotes several pages to this menagerie, the types of animals in it, the rich vegetation, and the songbirds that filled the air with their singing.¹⁹⁶ Special attention is devoted in this description to a couple of lions, male and female, and to their affective relationship with the sultan.¹⁹⁷ Beside lions and songbirds that filled Khumārawayh's palace gardens, there were various types of exotic animals, for which special cages were also built, such as elephants, tigers, cheetahs, and giraffes. There were also stables for domesticated animals such as horses of various breeds, mules, donkeys and camels. Expert keepers were responsible for these stables, and they received a generous salary, paid directly by the sultan.¹⁹⁸

Strangely enough, al-Maqrīzī does not describe similar menageries in Cairo under the Mamluks. He only notes, with reference to the above-mentioned animals received in 795/1393 from the ruler of Dahlak, that Sultan al-Zāhir Barqūq began building stables and other structures for their housing.¹⁹⁹ The absence of a detailed description of Mamluk menageries is all the more surprising considering that such descriptions exist with regard to other Islamic courts of the same period. Evidence of this may be found in a work by al-Malik al-Mujāhid, describing the court of the Yemenite Rasūlī rulers, who were under the protection of the Mamluks. This author king describes the elephants that were brought to his court from India, and

¹⁹⁵ Al-Maqrīzī, *al-Khiṭaṭ*, vol. II, pp. 379-380.

¹⁹⁶ *Ibid.*, vol. II, pp. 108-109.

¹⁹⁷ *Ibid.*, p. 117.

¹⁹⁸ *Ibid.*, p. 111 {وكلأء لهم السني والوظائف الكثيرة والأموال المتسعة}.

¹⁹⁹ Al-Maqrīzī, *al-Sulūk*, vol. III (2), p. 787.

the zebras from Mogadishu (today's Somalia), which were known as "wild donkeys." He mentions several types of zebra, explaining that these were strange animals with peculiar colours and their entire body covered in black and white stripes running symmetrically on both sides of the body. He states that the female zebras were more easily tamed and amenable for riding, and therefore could be raised in the court, but they did not live very long in captivity.²⁰⁰

Exotic animals, such as elephants, giraffes, peacocks, lions, tigers and zebras, seem to have been quite a common spectacle in the big Mamluk cities, especially in Cairo.²⁰¹ Yet in the sultan's court, the animals that were in the charge of official keepers were mainly horses, mules, dogs, falcons and hawks. The chronicles mention the titles of those appointed to high positions related to the care of these court animals, among whom were *nāẓir al-iṣṭabl*, *amīr akhūr*, *amīr shikār*, and others, who were in charge of the sultan's stables and hunting animals. Is it possible that they were also responsible for his menagerie, of which we have no detailed description? This question will have to remain open for the time being. Similarly, the very existence of a Mamluk "menagerie" in the sense of a special compound dedicated to the keeping of wild and exotic animals and attached to the sultan's court, like those ascribed to earlier Islamic rulers, also remains to be ascertained.

In any case, it may be assumed that concern for the welfare of all these animals, be they tamed or wild, concentrated in one compound or scattered in different places, included medical treatment and special supervision by skilled professionals, and the keepers in charge of such animals had to possess appropriate veterinary knowledge.

²⁰⁰ Al-Malik al-Mujāhid 'Alī b. Dā'ūd b. Yūsuf al-Rasūlī (d. 764/1362), *al-Aqwāl al-kāfiyah wa-al-fuṣūl al-shāfiyah fī al-khayl*, ed. Yahyā Jabūrī, Beirut: Dār al-Gharb al-Islāmī, 1987, p. 374.

²⁰¹ Western travelers write of their impressions on seeing these animals in Cairo. For example, a Spanish traveler named Pero Tafur describes the elephants that appeared in circus games in Cairo, as well as a giraffe that he saw there. See Pero Tafur, *Travels and Adventures*, 1435-1439, 78-79. Another traveler, Arnold Von Harff, who visited Cairo in the 15th century (1496-1499), reports seeing many elephants, lions, monkeys, giraffes, and other exotic animals, some of which were sold cheaply in the market. See Arnold Von Harff, *The Pilgrimage*, pp. 119-120. Al-Maqrīzī, *al-Khiṭaṭ*, vol. III, p. 372. Sultan al-Malik al-Nāṣir is reported to have sent an elephant and a giraffe to Aleppo in 740 AH. See Abū al-Fidā, *al-Mukhtaṣar*, vol. IV, p. 155.

I. COMPANION ANIMALS, SONGBIRDS AND STRAY CATS

1. *Dogs as Companion Animals*

According to Islamic law, which is based on the Prophetic tradition, the dog is an unclean animal. Keeping a dog at home or for any purpose other than herding flocks, guarding or hunting is forbidden. The Mamluk hunting literature does not deviate from these principles, although it gives a central place to the use of dogs for hunting, while ignoring the fact that dogs also served as companion animals in Mamluk society.²⁰² Some rare descriptions supply us with important information on hunters' relationships with their dogs. Evidently the fact that it was permitted to breed dogs for hunting purposes provided justification for those who sought it on religious grounds, but the question arises as to whether members of Mamluk high society who spent a great deal of their time hunting took account of the strict religious laws with regard to the raising of unclean animals such as dogs. The answer to this may, perhaps, be found in the book on hunting by Ibn Mankalī, who devotes several chapters to hounds. According to him, hunting enthusiasts allowed their dogs to sleep with them in the same bed and sit on their cushions. Ibn Mankalī asks Allah to forgive them for this sin. He also discusses the custom of dressing dogs to keep them warm, stating that it is permitted for dog owners to cover them with cloth for this purpose on condition that they do not use expensive silk. Instead of silk he recommends using rags dyed yellow and red.²⁰³ Ibn Mankalī emphasizes repeatedly that the dog is an unclean animal, and therefore every precaution should be taken not to contaminate the person who handles the dog. He cautions hunters not to treat dogs as they are treated by the ignorant Arabs of the desert, whom he castigates for ignoring the laws of purity and sleeping with the dogs in their arms, a behaviour described as reprehensible and in violation of the laws of religion.²⁰⁴

These words of Ibn Mankalī indicate that dogs not only served for hunting purposes but also as companions, for amusement and pleasure. In fact,

²⁰² For a discussion on the use of dogs in Islam according to religious law, see al-Nāshirī, *Kitāb Intihāz al-furaṣ*, pp. 30-39; Jalāl al-Dīn 'Abd Allāh b. Abī Bakr al-Suyūṭī (1445-1505), *al-Dibāj 'alā ṣaḥīḥ Muslim ibn al-Ḥajāj*, ed. Abū Ishāq al-Ḥuwaynī al-Atharī, al-Khabar (Saudi Arabia): Dār Ibn 'Affān, 1996, vol. V, pp. 7-10.

²⁰³ Ibn Mankalī, *Kitāb Uns al-malā*, pp. 142-143.

²⁰⁴ *Ibid.*

not only dogs but other hunting animals, such as cheetahs, cats, and even hawks also served as companion animals.²⁰⁵

In the ninth century, al-Jāhīz mentioned in his *Kitāb al-Ḥayawān* a sort of Chinese dog (*Ṣīnī*), trained to perform tricks for ladies.²⁰⁶ Although no evidence of such dogs has been found in Mamluk sources, similar lap-dogs for ladies may also have existed in Mamluk society.

2. Songbirds

Songbirds were very popular in the markets of Cairo. Al-Maqrīzī describes enthusiastically the songbird market which offered an immense variety of songbirds, mentioning the popular custom of visiting these markets to buy birds. They did not buy the birds to keep in a cage but to give to their children, who freed them in front of all the people. This act of releasing birds derived from the prevalent opinion that birds carried a prayer of thanksgiving and praise of God as soon as they were released from the cage, an act regarded as a good deed for which they would be rewarded on the Day of Judgment.²⁰⁷ Western travelers visiting the Islamic east were surprised by this unusual attitude toward birds. One description, from the thirteenth century, appears in a work by Rinaldo da Monte Croce, a Dominican monk who was sent by the pope as a missionary to eastern Mongolia. He refers to the release of birds by Muslims in Baghdad as a religious precept, as an alternative to liberating slaves.²⁰⁸ Al-Maqrīzī, marveling at the huge number of birds sold in the Cairo songbird market, explains that the parents encouraged their children to release the birds they were given in the belief that the good deed would be attributed to the child on the Day of Judgment.²⁰⁹

An unusual use of birds is sometimes described in travelers' accounts. Leo Africano reports how he saw a juggler in Cairo with small birds tied in a box, into which he put slips of paper containing positive and negative prophecies.

²⁰⁵ For a description of the female cheetah belonging to the father of Usāmah Ibn Munqidh, see Ibn Munqidh), *Kitāb al-Iṭibār*, pp. 207-209. On the falcon that Usāmah's father kept on a velvet rug in his bedroom, see p. 204.

²⁰⁶ Viré, "Kalb," pp. 489-492.

²⁰⁷ Al-Maqrīzī, *Khīṭaṭ*, vol. III, p. 156.

²⁰⁸ Benjamin Arbel, "The Attitude of Muslims to Animals: Renaissance Perceptions and Beyond," *Animals and People in the Ottoman Empire*, ed. Suraya Faroqi, Istanbul: Eren, 2010, p. 63; N. Daniel, *The Arabs and Medieval Europe*, London, 1979, p. 219.

²⁰⁹ Al-Maqrīzī, *al-Khiṭaṭ*, vol. III, p. 156.

The passers-by would put coins in the box and the bird took the coin and in return gave the donor a slip of paper containing a prophecy.²¹⁰

3. Stray Cats

The cat is still the most popular pet in the Muslim world. It is also an animal from which much benefit can be derived, particularly for keeping away vermin and snakes, and even for hunting, as mentioned in the hunting literature.²¹¹ There is no written evidence of veterinarians treating cats, but it may be assumed that street cats were taken care of, at least in terms of supplying them with food and water.

Western travelers, among others, provide information on cats in the Mamluk territories. The Flemish traveler, Josse van Ghistele, who spent four years in the Levant (1481-1485), describes a cat shelter in Damascus, located next to a hospital for the poor and needy.²¹² It seems that in those days a cat shelter was a phenomenon unique to Muslim society. In addition to its ethical function of treating pets well, it emphasized the powerful link that existed between people and animals. Undoubtedly, such behaviour toward animals was based on Islamic traditions that teach consideration for animals and even include specific instructions from the Prophet demanding positive and gentle treatment of cats. One tradition, often quoted in essays of that period, tells of a cat that bore kittens on the robe of the Prophet, who then took off his robe so as not to disturb the cat while she was feeding her young. This tradition includes an explicit teaching of the Prophet that it is a great sin to refuse any creature that asks you for help. It is not mentioned in the canonical Hadith literature. Apparently, it was a popular tradition that attributed to Muhammad the noble act towards the cat. One may read of similar acts that were attributed to famous reli-

²¹⁰ The traveler relates that he himself threw a coin in and the bird gave him in exchange a note prophesying bad things in the future, but he did not ascribe importance to this. He adds that later the prophecies came true and even worse things happened. See L. Africano, "Descrizione dell'Africa," vol. I, p. 407.

²¹¹ Ibn Mankalī, *Kitāb Uns al-malā*, p. 147.

²¹² As well as the famous hospital in Damascus, Sultan Qalāwūn built the large hospital in Cairo known as the al-Manṣūrī, which was the biggest and most important hospital of that time. Another hospital in the Mamluk Empire was the al-Nūrī hospital in Aleppo. In point of fact, this hospital was built during the Ayyubid period, but the Mamluks continued to invest in it and administer it excellently. See Aḥmad 'Isā Bik, *Tārīkh al-bīmāristānāt fī al-Islām*, Beirut: Dār al-Rā'id al-'Arabī, 1981, pp. 83-171; al-Maqrīzī, *al-Khiṭaṭ*, vol. IV, pp. 259-263. On hospitals in the major cities during the Mamluk period, see 'Abd al-Qādir Muḥammad al-Na'imī al-Dimashqī (927/1520), *Tārīkh al-dāris fī al-madāris*, ed. Ja'far al-Ḥusnī, Damascus, 1988.

gious figures in Islam, such as the twelfth-century Shaykh Abū al-‘Abbās b. Abī al-Ḥasan b. al-Rifā‘ī. It was told of this Shaykh that a cat fell asleep on the sleeve of his robe, and he chose to tear his garment in order to go and pray rather than disturb the sleeping cat. Al-Aḥwadhī states that the act attributed to the Prophet Muḥammad belongs to a popular tradition that is not anchored in the canonical Ḥadīth literature.²¹³ According to the literary sources, the cat shelter in Damascus was established in commemoration of this event, and it was maintained by the generosity of the city’s inhabitants. Van Ghistele reports that many people, both wealthy and poor, would drop coins into a hole made in the wall at the entrance to the shelter as an act of charity.²¹⁴ Arnold van Harff, who visited the Levant between the years 1496-1499, relates that he saw a cat sitting on the coat of a Mamluk in Cairo and, apparently aware of the tradition, he stood and waited to see what the man would do. And in fact, to avoid disturbing the cat, the Mamluk stood up and walked away, leaving the coat spread out under the cat.²¹⁵

These testimonies may indicate that Mamluk society was aware of medieval Islamic precepts concerning appropriate attitudes to animals, including dogs, cats and other creatures. Indeed, Ḥadīth literature contains several traditions attributed to the prophet Muḥammad, from which one can derive a clear conclusion that animals are worthy of mercy, and that improper behaviour towards them is reprimanded.²¹⁶

²¹³ See Abū ‘Alī Muḥammad ‘Abd al-Raḥmān b. ‘Abd al-Raḥīm al-Mubārḳfūrī, *Tuḥfat al-Aḥwadhī bi-sharḥ jāmi’ al-Tirmidhī*, ed. ‘Abd al-Raḥmān Muḥammad ‘Uthmān, vol. I, p. 262; *Tabqāt al-shāfi’iyyah al-kubrā*, vol. VI, p. 24 (biog. 576); Shams al-Dīn Muḥammad b. Aḥmad b. ‘Uthmān al-Dhahabī, *Siyar a’lām al-nubalā’*, eds. Shu‘ayb al-Arnā’ūt, Bashār ‘Awwād Ma’rūf and others, Beirut: Mu’assasat al-Risālah, 1989 (6th ed.), vol. XXI, pp. 77-80 (biog. 28).

²¹⁴ Arbel, “The Attitude of Muslims,” p. 64; Josse van Ghistele, “Le Voyage en Orient de Josse van Ghistele,” *Revue Générale*, vol. XXXVIII (Bruxelles 1883) p. 66; F. Viré, “Kalb,” pp. 510-513.

²¹⁵ Harff, *The Pilgrimage*, p. 119.

²¹⁶ See, for example, al-Damīrī, *Ḥayāt al-ḥayawān*, vol. II, p. 251; Aḥmad b. Muḥammad Abū ‘Abd Allāh b. Ḥanbal, *Musnad al-imām Aḥmad b. Ḥanbal wa-bi-hāmishihi muntakhab kanz al-ummāl fī sunan al-aqwāl wa-al-aḥwāl*, Beirut: Dār Ṣādir, vol. II, p. 375; al-Suyūṭī, *al-Dibāj*, vol. V, pp. 259-260 (*kitāb al-ṣayd wa-al-dhabā’ih, aḥādīth 2244-2245*); Mu’awwad, *Ṭibb al-qulūb*, pp. 143-144; *Sunan Ibn Mājah*, vol. I, p. 402 (*Ḥadīth 1265*), vol. II, p. 1421 (*Ḥadīth 4256*); *Sunan al-Nassā’ī*, vol. III, p. 149; Abū Zakariyyā Yaḥyā b. Sharaf al-Nawawī, *Sharḥ al-Nawawī ‘alā ṣaḥīḥ Muslim*, Beirut: Dār Iḥyā’ al-Turāth, 1392, vol. IV, p. 240, *Tafsīr al-Qurṭubī*, vol. VII, p. 216.

CHAPTER TWO

THE PRE-MAMLUK VETERINARY TRADITIONS

A. INTRODUCTION: THE SOURCES OF MAMLUK VETERINARY KNOWLEDGE

The writers of Arabic veterinary literature drew their information from many different sources, which are often difficult to trace, mainly because the material reaches us as a jumble of traditions coming from different cultures, such as Greek, Persian, Armenian, and Indian. We often find that identical contents are ascribed by different authors to two different cultures. Not only is the identification of the traditions problematic, but also the names of the writers, particularly those whose works were incorporated in the Arabic-Muslim tradition after being translated into Arabic.

In this chapter it is not my intention to reconstruct the sources used by writers of Arabic veterinary treatises of the Mamluk period. Studies of this nature have been conducted by scholars, some of them philologists and others veterinarians.¹ Despite the importance of these studies, the question arises as to whether their authors took a sufficiently critical approach in adopting unquestioningly the ascription of the Arabic essays to Greek, Persian, Indian and other sources, assuming that such ancient treatises existed in reality.² My assumption is that expressions such as “the Persians said,” “the Greek sages said” are, at least in some cases, formulas used by the Arab writers that do not constitute proof of the existence of a written source, and certainly do not prove the existence of a specific book.³ There-

¹ See the section on historiography in the Introduction.

² Möller attempted to identify the primary sources of treatises that bore names such as ‘The Byzantine Writings’, ‘The Indian Writings’, ‘The Persian Writings’. He claims that these writings were translated into Arabic during the Umayyad period, and particularly during the early Abbasid period, and became the basis for all the works on falconry that were later written in Arabic. He does not attach any importance to the addenda, notes or forewords of these later treatises, regarding them merely as mistakes in the original text. See Möller, *Studien*, pp. 44-60.

³ In his research, Björck deals with the ways in which Greek veterinary knowledge was transmitted to Arabic, and for this purpose he investigates the Greek sources that formed the basis for Arabic veterinary treatises and attempts to identify them by textual comparison. He mainly examines passages from the Greek corpus and compares them to those in Ibn al-‘Awwām’s book (12th century). Björck uses descriptions of Arabic manuscripts in various catalogues, stating explicitly that he does not know Arabic and therefore uses the French

fore, one should be skeptical about the attribution of certain information to a particular tradition. At the same time, one should not take lightly those oral traditions that were handed down from generation to generation, and from one culture to another, until they were compiled in treatises and set down in writing, thus preserving a direct link to a certain heritage. This occurred mainly in the period, known as the Golden Age (ninth to tenth century CE), when many of the oral, literary and scientific traditions were set down in writing and collected in books. In this context it is important to note the traditions that originated in classical Greek medicine and reached the Islamic world through translation to Arabic.⁴

Oral traditions handed down over the generations include professional knowledge transmitted from father to son, thus preserving the profession within the family. An example related to veterinary medicine concerns the cadi Ḥayyān b. Bishr who questioned a veterinarian on the manner in which he had acquired his profession. The latter explained that he had inherited the profession from his father, who in turn had inherited it from his father, and he from his father, and so on and so forth. Thus, like the role of cadis, the profession of animal doctor was also handed down through the generations and preserved in the family.⁵ Since traditions associated with particular cultures were passed down by word of mouth, it may be assumed that the authors who eventually set them down in writing saw fit to mention their origin. Indeed, we find differences in content between traditions attributed to different peoples. In fact, we can distinguish between traditions belonging to the Graeco-Roman-Byzantine heritage and those

translation of Ibn al-ʿAwwām. Both in Ibn al-ʿAwwām and in the descriptions of Arabic manuscripts in catalogues he identifies the major Greek writers who, according to him, were the direct or indirect source of the veterinary knowledge that is presented in the work of Ibn al-ʿAwwām. Using editions of two veterinary treatises in Latin and Medieval Italian, he concludes, in contrast to the compiler of the corpus, that 'the Indian Hippocrates' cited in Ibn al-ʿAwwām is not the Hippocrates of the Greek corpus. See Gudmund Björck, "Griechische Pferdeheilkunde in arabischer Überlieferung," *Le Monde Oriental, Revue des Etudes Orientales*, vol. XXX (1936), p. 10.

⁴ Claude Cahen compares the translation movement in the early Abbasid period to the European Renaissance of the 12th and 13th centuries. This was mainly the period of the "House of Wisdom" founded by Caliph al-Ma'mūn, when many classics were translated into Arabic and became models for Arabic prose writers for many generations. See Claude Cahen, *L'Islam: des Origines au début de l'Empire Ottoman*, Frankfurt am Main: Bordas, 1970, pp. 87-96; Ignaz Goldziher, *A Short History of Arabic Literature*, tr. Pessah Shinar, Jerusalem: The Magnes Press, The Hebrew University, 1979, pp. 86-100 [Hebrew]; M. Ullmann, *Islamic Medicine*, pp. 7-40.

⁵ Kamāl al-Dīn ʿUmar b. Aḥmad b. Abī Jarādah Ibn al-ʿAdīm, *Bughyat al-ṭalab fi tā'rikh Ḥalab*, ed. Suhayl Zakār, Damascus: Dār al-Ba'th, 1408/1988, vol. VI, pp. 2999-3000.

attributed to the Persian, Indian, Armenian, Turkish, *Jāhili* Arabic or Muslim Arabic heritages.

B. THE GRAECO-ROMAN-BYZANTINE HERITAGE

The Greek scholar Tsaknakis describes the first Byzantine period as one of the major periods in professional veterinary literature. He writes that the activity of figures such as Apsyrtus, Theomnestus and Hippocrates yielded the earliest clinical diagnoses of illness in animals, particularly in horses. In veterinary pathology, this period marks the beginning of thorough and methodical clinical research. According to Tsaknakis, prior to the Middle Byzantine period, in the context of the general thirst for study of the classical writers, two important compilations on veterinary medicine were produced: one on hippiatrics and the other on geoponics. These two compilations were carefully copied. In the later Byzantine period (thirteenth century), treatises, some of them anonymous, appeared with titles such as *Orneosophia* (the wisdom of treating birds), *Ierakosophia* (the wisdom of treating falcons), and *kynosophia* (the wisdom of treating dogs). These collections include veterinary elements related to hunting. Starting in the eighth century, Byzantine animal doctors were known among Arabs and later also in the west. In addition to these two compilations, Tsaknakis refers to a compilation named “Hippiatria,” saying that this is a pure veterinary project and is bigger than the two aforementioned collections. The earliest manuscript of this book that is extant dates to the tenth century and was composed by order of Emperor Constantine VII, Porphyrogenitus. The compilation is composed of chapters bearing the authors’ names as well as some anonymous chapters, all from the Byzantine period and earlier. It also cites authors, referred to by name or by the content of their essays, whose works are not included in the collection because most of them were lost. The most famous of the writers included in the Greek Corpus are Apsyrtus (who takes up 121 chapters in the Berlin manuscript), Hierocles (107 chapters), Pelagonius (48 chapters), Hippocrates (36 chapters), Theomnestus (31 chapters) and Thēbaios (31 chapters). Other writers who take up less space are Hieronymos Livos (6 chapters), Cassius (3 chapters), Magon Karchēdonios (3 chapters), Nēphon (1 chapter) and Litorius Beneventanos (1 chapter).⁶

⁶ Τασος Α. Τσακνάκης, *Ιστορία της Ελληνικής Κτηνιατρικής*, Thessaloniki: University Studio Press, 2002, pp. 153-154. For the most recent research on the Byzantine treatises on veterinary

As we have mentioned, Leclainche, in his book on the history of veterinary science, writes that there is in general no significant difference between Arab and Greek veterinary science, and the Arabs' advantage is manifested mainly in the sphere of medication and in a number of surgical procedures.⁷ Is this really so? We have to remember that this scholar's knowledge of Arabic was minimal at best, and therefore his assumptions are based largely on a few treatises that were translated into European languages. The most famous of these is that of Ibn al-ʿAwwām, hence many scholars believe it to be the best Arabic treatise on veterinary science and judge the quality of veterinary medicine in the twelfth century accordingly.⁸ The importance of Ibn al-ʿAwwām's treatise with regard to agriculture is beyond question, but this is not the case as for as veterinary medicine is concerned, particularly if we compare his work with books written by professional veterinarians whose knowledge and experience enabled them to criticize classical sources that Ibn al-ʿAwwām only summarizes in his book.

It may be assumed that he did not make direct use of the Greek authors who wrote on horse doctors, nor of the Indian Hippocrates whom he mentions a great deal, but derived his material from other scholars, especially from Ibn Akhī Ḥizām, the author of a veterinary book (now lost) that is the earliest known Arabic work on this subject written by a professional author.⁹ Ibn Akhī Ḥizām was apparently the chief veterinarian responsible for the horses during the period of the Abbasid Caliphs al-Mutawakkil (232-247/847-861) and al-Muʿtaḍid (279-289/892-902). In Ibn Akhī Ḥizām's book this material is combined with other subjects, apparently without mention of the source. Hence, Ibn al-ʿAwwām, too, often fails to mention Greek veterinary sources by name, but a comparison with the Greek Corpus reveals that Ibn Akhī Ḥizām drew the contents of his book from the Arabic translation of Theomnestus, which was carried out in the school of Ḥunayn b. Ishāq.¹⁰

medicine, see Anne McCabe, *A Byzantine Encyclopaedia of Horse Medicine: The Sources, Compilation, and Transmission of the Hippiatrica*, Oxford University Press, 2007.

⁷ Leclainche, *Histoire*, p. 117.

⁸ *Ibid.*, pp. 112-118. See also section H below, in the discussion on Ibn al-ʿAwwām.

⁹ On Ibn Akhī Ḥizām see J. Ruska-[F. Viré], "Ibn al-Mundhir." *E.I.*², vol. III (1971), pp. 890-891; Bibliothèque Nationale, Paris, *Ms. Arabe 2814*.

¹⁰ Robert G. Hoyland, "Theomnestus of Nicopolis, Ḥunayn ibn Ishāq and the beginning of Islamic veterinary science," *Islamic Reflections, Arabic Musings: Studies in Honour of Professor Alan Jones*, ed. F. Kennedy, Oxford: Gibb Memorial Trust, 2004, pp. 160-162.

Later professional writers, such as Abū Bakr al-Bayṭār (d. 1340 CE), also incorporated in their essays a great deal of material from that Classical tradition. It may be said that the Classical tradition provided the Mamluk veterinarians with their theoretical basis, particularly regarding the theory of the four humours (which will be discussed in chapter 4), as well as general zoological and anatomical knowledge that may be attributed to that culture.¹¹

The sources from which the Mamluk veterinary authors drew their knowledge are not easy to trace because very little is known of independent Classical Greek veterinarian treatises; yet a great deal of veterinary material apparently reached the Mamluk writers from these sources. Much of the translation of scientific treatises from Greek to Arabic, including medical treatises that contained veterinary material, was done by Nestorian Christians, who had experience in translation prior to the Islamic rule, due to their close association with the Sassanid court. The shift of the Muslim political-cultural centre from Damascus to Baghdad at the end of the Umayyad regime (in 750) brought these scholars closer to the Abbasid court. The translation movement, which began during the reign of the Abbasid caliph, al-Ma'mūn (198/813–218/833) and continued throughout the tenth century was the main channel conveying Greek knowledge to Arabic. The institute known as the 'House of Wisdom' (*Bayt al-Ḥikmah*),

¹¹ Galen, for example, is described in other Arabic treatises as dissecting the bodies of monkeys in order to study their internal organs. Galen reached the conclusion that the monkey's body is surprisingly similar to the human body, not only in anatomy but also in physiological and psychological systems, such as the act of closing the eye, producing tears, and so forth. Al-Nadīm, in his 10th century bibliography, mentions two treatises on animal surgery attributed to Galen and translated into Arabic by Ḥubaysh, Hunayn's nephew: one on surgery on living animals and the other on dissection of dead animals. See al-Nadīm, *Al-Fihrist*, p. 349. An untitled treatise of the British Library (presumably *Kitāb Ḥayāt al-ḥayawān* by al-Damīrī) describes how Galen dissected the bodies of monkeys in order to learn about the human body and its physiological systems; see London, British Library, Ms. ADD. 21,102 (996), *Historia Animalium-Arabice*, fol. 62r°. An untitled treatise, written by Abū Duād al-Ishbili, contains a quotation from Galen concerning the effect of external influences on the unborn foal in its mother's womb. The author warns against exposing the pregnant mare to ugly sights or people which might cause her to give birth to an ugly foal. According to this work, Galen even suggests that the stallion should be dressed in fine clothes of many colours during the mating so that the foal will emerge well-formed and appropriately coloured. The author adds that one can certainly find a horse with a different nature and characteristics from those of his father and other members of his family, as it happens with humans. See Bodleian Library, Oxford., Ms. Arab. d. 208, fols. 4v°–5r°. The biography of Galen that appears in Ibn Juljul's biographical book on doctors claims that he was the first doctor on earth who dissected corpses for the purpose of learning. See Abū Dā'ūd Sulaymān b. Ḥassān al-Andalusī Ibn Juljul, *Ṭabaqāt al-aṭibbā' wa'l-ḥukamā'*, ed. Fu'ād al-Sayyid, Cairo: al-Ma'had al-'Ilmī al-Faransī li'l-Āthār al-Sharqīyah, 1955, p. 42.

founded by Caliph al-Ma'mūn, dealt with the methodical translation of the 'wisdom of the Greeks' into Arabic. This was largely a product of the world view of the theological rationalism of the *Mu'tazilah* school of theology, encouraged and sponsored by al-Ma'mūn. The *Mu'tazilah* believed that knowledge of the wisdom of ancient peoples, rather than threatening the "new" Muslim religion, could actually also supply proof of the truth of Islam. The proponents of this school of thought saw learning and acquiring knowledge, even of pagan peoples, as a way of knowing God and a true path to the Muslim faith, which integrates reason and logic with belief in one God. Many Islamic clerics opposed this school and even accused its members of heresy, but al-Ma'mūn was the first Abbasid caliph who gave official recognition to this school of theology.¹²

Greek sources were translated into Arabic via Syriac or Persian (Pahlavi) or directly from the source. It is interesting to note that many of the scholars who were involved in the translation project were physicians, and were even numbered among the court doctors of the Abbasid rulers. One of the most famous of these doctor-translators was Ḥunayn b. Ishāq (d. 873), a Christian Arab from the town of Ḥīrah in Iraq, who was the son of a pharmacist. He was invited by Caliph al-Mutawakkil to be head of the *Bayt al-Hikmah*, and there he developed a group of students who continued his project, among them his son Ishāq. Another group of translators who came to the Abbasid court from the city of Ḥarrān in north-west Mesopotamia was the family of Thābit b. Qurrah, who belonged to the *al-Ṣābi'ah*—a sect that strove to preserve the heritage of ancient cultures in astrology and mathematics, as well as medicine. Another translator who acquired repute among this group was the Melchite Christian Qusṭā b. Luqā, who lived in the second half of the ninth century. But the most famous names in the realms of translation and medicine belonged to the Bakhtayshū' family. This Nestorian family, whose members had served for generations as directors of hospitals in Persia, operating from Sassanid times until the eleventh century, managed to rise on the social ladder until some of its members not only served as court doctors to the Abbasid caliphs but were also appointed as viziers and even rivaled the wealth of the ruler.¹³

The identification of the Classical sources of Arabic veterinary literature is quite complicated. Many of the familiar names that appear in literature

¹² On the *Mu'tazilah* school see John L. Esposito (ed.), *The Oxford History of Islam*, Oxford: Oxford University Press, 1999, pp. 27, 89, 278-28.

¹³ Ibn Abī Uṣaybi'ah, *Uyūn al-anbā' fī ṭabaqāt al-aṭibbā'*, Beirut: Maktabat al-Ḥayāh, n.d., pp. 201-209.

on human medicine, such as Aristotle, Hippocrates, Galen and Dioscorides, are also mentioned frequently in Arabic veterinary essays.¹⁴ Here and there names are mentioned that cannot be identified unmistakably by the existing philological research. Although Apsyrtus (approx. 300-360 CE) was known as the most famous animal doctor in ancient times and served as the major source of Greek veterinary collections,¹⁵ his place in Arabic veterinary treatises is less important than that of Theomnestus. Apsyrtus is mentioned in a few manuscripts, such as Paris, Arab. 2812 and Arab 2810 and Leiden 1411 (= Cod. 299, 3 Wan).¹⁶ Other important names in this field, such as Columella (first century CE), who wrote a book on agriculture in Latin, or Hierocles (4th century CE) are not mentioned in the Arabic sources.¹⁷

Various Arabic veterinary treatises refer to the book by Theomnestus of Magnesia, who was active between the years 310-340 CE.¹⁸ Its translation

¹⁴ The extensive mention of these authors in the sources of Islamic medicine can be understood in the context of translations of Greek sources to Arabic. On this subject, see Ullmann, *Islamic Medicine*, pp. 8-15. Citations from these writers in Arabic veterinary sources appear in: Abū Zayd Hunayn Ibn Ishāq al-ʿAbbādī, *Kitāb Gālīnūs fī fīraq al-ṭibb li-al-mutaʿallimīn*, ed. Muḥammad Salīm Sālim, Cairo: Dār al-Kutub, 1978; (e. g.) Ibn al-Nafīs, *Kitāb Sharḥ tashrīḥ al-qānūn*, ed. Salmān Qatāya, Cairo, 1988, pp. 80, 101, 105, 119, 125, 137, 153, 174, 293, 317; (e. g.) Ibn Sīnā, *al-Qānūn fī al-ṭibb*, ed. Idwār al-Qash, Beirut: Muʿassasat ʿIzz al-Dīn liʾl-Ṭibāʿa waʾl-Nashr, 1993, vol. I, pp. 408, 482, 484, 490, 540-541, 543-547, 629, 634, 732, 739, 769, 2: 909, 1269, 1314, 1318, 1341, 1346, 1511. It is not uncommon to find citations from Galen, Aristotle and others in Arabic veterinary literature. A manuscript that has survived from Ibn Akhī Ḥizām's treatise contains many passages that he ascribes to Greek sources, and in particular he quotes Aristotle (or, mistakenly, Aristotle's son), and even mentions the name of the famous essay on animals from which he drew the material. See B.L., Ms. ADD. 23,416.

¹⁵ McCabe, *A Byzantine Encyclopaedia of Horse*, pp. 122-155.

¹⁶ Τσαχνάκης, *Ιστορία*, pp. 152-153. On Apsyrtus, see Dunlop and Williams, *Veterinary Medicine*, pp. 181-183.

¹⁷ About the animal doctors in ancient Rome, see Dunlop and Williams, *Veterinary Medicine*, pp. 155-175; Τσαχνάκης, *Ιστορία*, pp. 127-139.

¹⁸ Theomnestus was one of the outstanding writers on horse medicine in the Byzantine period. According to the first version published by Heusinger, Theomnestus served the Ostrogothic King Theodoric on his journey to Pannonia and Italy, hence he apparently lived and worked in the 5th century CE. According to the second version, represented by Oder, based on philological study of the text on hippiatrics by Berrolikos, Theomnestus accompanied the Roman Emperor Licinius on his journey to Rome, when the latter demanded Constantine's sister for a wife. According to this version, which appears to have more credence, Theomnestus was a contemporary of Apsyrtus, since Emperor Licinius reigned from 308 to 324 CE, and then was condemned to death by Emperor Constantine in violation of an oath that he had sworn to his sister Constantia to spare the life of her vanquished husband. Beyond the indirect evidence for dating Theomnestus, it may be assumed that he was a military hippiatr who served in the emperor's army. His name is not mentioned in the manuscripts except for treatises on horse medicine and we do not

into Arabic, under the title *Kitāb al-Taṭbīb fī al-Bayṭarah*, by Ḥunayn b. Ishāq (9th century) made it renowned throughout the Muslim world. It survived in the translated version, and Arabic writers refer specifically to the veterinary material taken from it.¹⁹ The version extant today is a very meager manuscript compared with other Arabic treatises of veterinary medicine, particularly those written in the Mamluk period.

Another name that appears frequently in Arabic treatises as a source of veterinary information is Hippocrates. This name has led to great confusion among historians of veterinary medicine, since there were several people of the same name from different periods and different cultures. To all appearances, this was not the Hippocrates of the fourth-century BCE, but a veterinarian of the same name who lived at the end of the Byzantine period. To add to the confusion, there was also an Indian veterinarian named (or nicknamed) Hippocrates who wrote a veterinary book in Sanskrit, which was translated into Greek in the sixth century under the title Hippocras.²⁰ At all events, there is no reason to assume that the Hippocrates of the Greek Corpus (not the Indian) was the source of that knowledge, nor is there any reason to assume that he had a special role in transmitting veterinary knowledge from Greek to Arabic.

The predominant name in Arabic veterinary essays is that of Aristotle, not only in the context of general zoological information but also because of the complete veterinary treatise attributed to him.²¹ The attribution of

even know the name of his treatise, but careful study of the manuscripts in the compilation of essays on hippiatrics leads to the conclusion that he was one of the dominant figures of his period in the field of horse medicine. His works include very personal aspects, free of the authority and rigidity of tradition. Τσαχνάκης, *Ιστορία*, p. 145; McCabe, *A Byzantine Encyclopaedia of Horse*, pp. 181-207; Eugen Oder, "Apsyrtus, Lebensbild des bedeutendsten altgriechischen Veteinärs," *Veterinaerhistorisches Jahrbuch*, II (1926), pp. 121-136.

¹⁹ Dunlop and Williams, *Veterinary Medicine*, p. 189; J.F. Smithcors, *Evolution of the Veterinary Art: A Narrative Account to 1850*, Veterinary Medicine Publishing, Kansas City, Missouri, 1957, pp. 119-120; Fredrick Smith, *The Early History of Veterinary Literature and its British Development*, J.L. Allen, London, 1976, pp. 38-39 [Vol. 1 reprinted from *The Journal of Comparative Pathology and Therapeutics*, 1912-1918]; for a discussion of the Arabic translation of Theomnestus's work and its influence on Islamic veterinary science, see Hoyland, "Theomnestus of Nicopolis," pp. 150-169.

²⁰ Smithcors, *Evolution of the Veterinary Art*, p. 44; Smith, *The Early History of Veterinary Literature*, pp. 35-36.

²¹ A manuscript in the Cambridge University Library, Ms. Qq. 124, cites Aristotle as the major source quoted. The manuscript bears the title "*Kitāb yata'allaq bi-al-bayṭarah wa-amrād al-khayl wa-kayfiyat al-dawī nāfi' in-shā'-Allāh ta'ālā āmin*" (كتاب يتعلق بالبيطرة وأمراض الخيل وكيفية الدوي نافع إن شاء الله تعالى آمين), and the author claims 'Aristotle the wise' as his source. He writes that Aristotle was vizier and chief advisor to King Alexander of Macedon, king of Alexandria and king of the Romans. During a military campaign, which lasted for

material to Aristotle, as to other famous figures, is clearly related to the practise known in Arabic as *isnād*, that is to say, attribution of things to an authoritative and famous person so as to give them more credibility.

Abū Bakr al-Bayṭār (d. 741/1340) was one of the important veterinarians of the period, not only because he was the court veterinarian of the Mamluk Sultan al-Nāṣir Muḥammad Ibn Qalāwūn but also because of his comprehensive veterinary treatise, which teaches us a great deal about the different traditions that were passed down to the Muslims and served the writers in their veterinary compilations. In the introduction he names several sources, some of which are cited by Ibn al-ʿAwwām, particularly those belonging to the classical tradition: Aristotle, Hermes, Galen and Hippocrates, all of whom he groups together under the category of 'ancients'. Yet, there is barely a mention of authors or sources in the body of the book. In chapters discussing signs that help the veterinarian to diagnose illnesses he does not refer to any sources, and the same applies to the concluding chapter, which contains a list of recommendations for establishing a professional code, especially for rules of medical-veterinarian ethics. He ascribes these recommendations to anonymous veterinarians without mentioning specific sources.²²

Much of the content of Abū Bakr's book is said to be based on sources that he calls 'the ancients' or 'wise and learned people',²³ most of them

three years, a plague afflicted the king's horses and soldiers. Aristotle sent him a veterinary book containing advice on how to treat horses in order to prevent the spread of diseases and plagues, saying that most of the soldiers were left without horses, and they did not know how to treat the horses that were infected by the plague. The book was a scientific veterinary treatise that explained the symptoms of diseases and their treatment. He added that the book should be kept by wise and knowledgeable people and taken with them on their campaigns. Elsewhere in the manuscript the author quotes Aristotle as comparing the horse's nature to human nature according to the theory of the four humours. Cambridge University Library, Ms. Qq. 124, fol. 2r^o.

²² Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 115. An exception to Abū Bakr's reliance on ancient sources concerns his recommendation on the extent of bloodletting as a preventive measure in the treatment of horses. Although the method was common in the Classical tradition, the author emphasizes that this subject does not appear in any previous veterinary book. This raises the assumption that Abū Bakr's recommendation is based on his personal experience. Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 119.

²³ The many examples of this in Abū Bakr's book include: {وله أيضا. . . وهذا العلاج من} (e.g.) Abū Bakr al-Bayṭār, *Kāshif*, 2: 149, 159, 169, 181, 305, 315, 317, 345. The use of chicken dung (e.g.) Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 315, 363, 379. treatment of constipation using medicine made by cutting up the organs of a dog's pup and brewing them in a confection (وقد ذكر القدماء في كتبهم انه يؤخذ جرو و كلب صغير) see Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 395. This treatment also appears in Ibn al-ʿAwwām's *Kitāb al-Filāḥah* (vol. II, pp. 667-668) where he cites the source

presumably from the classical tradition (Graeco-Roman-Byzantine). There are numerous examples of this, because it was this tradition that furnished the medical basis for using animals' body parts in human medical treatment, which appears frequently both in veterinary treatises and treatises on human medicine.²⁴ The attribution of such prescription to 'philosophers', a term generally associated with the Classical tradition, especially the Greek, supports this assumption,²⁵ and it is further reinforced by a comparison of additional passages that Abū Bakr states explicitly are "from the ancients" with similar passages from other manuscripts, where the content is attributed to al-Rūm (the Romans or Byzantines).²⁶

In addition to bloodletting, he quotes from 'the ancients' prescriptions that include poisonous substances, especially arsenic, which could be fatal. The use of arsenic may also come from the Indian tradition, which specialized in medication and concocting poisonous mixtures.²⁷ To cure frog disease, which affects the underside of the tongue, Abū Bakr mentions a cure that involves cooking frogs in boiling water and serving the resultant soup to the affected animal, describing this as a "treatment of the ancients."²⁸

as Ibn Akhī Hizām. Elsewhere in Abū Bakr's book he describes an amulet, remarking that he found it in 'veterinary books'. In the latter case, he quotes a sentence saying "in the opinion of the ancients" in the context of the number of stallions needed to service a mare in heat. He writes that according to the ancients one stallion was enough for ten mares. A similar sentence appears in Ibn al-'Awwām. Also, in the Paris manuscript- B.N. (*arab*. 2814) of Abū Bakr's book, the method described for determining the sex of the foetus is similar to that described in Ibn al-'Awwām. See Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 105 (note 25); Ibn al-'Awwām, *Kitāb al-Filāḥah*, vol. II, p. 489.

²⁴ For treatment of the illness known as fox disease = alopecia (*dā' al-tha'lab*), Abū Bakr al-Bayṭār suggests using animal fat. Listing the animals that he describes as sources of fat, he mentions dogs, foxes, pigs, lions, bears, mice, and even elephants. See Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 137.

²⁵ (ذَكَرَ بَعْضُ الْفَلَّاسَةِ أَنَّ لِلْفَرَسِ جَنَاحَانِ فَإِذَا نَشَرَهُمَا لَا يَبَالِي بِمَا عَلَيْهِ مِنَ الثَّقَلِ) Abū Bakr quotes one of the philosophers as saying that the horse has wings and therefore he spreads them and does not feel or notice the heavy weight placed on his back. This statement is certainly strange, especially the fantastic description that has no connection with reality. In this single case, Abū Bakr does not judge the statement or refer to it, and perhaps it is one of those statements that he includes in his book in order to show contempt for the opinions of the ancients. See Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 305.

²⁶ (وَقَدْ ذَكَرَ الْمُتَقَدِّمُونَ) Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 149; Treatment of scabies: Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 125; a common skin disease: Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 125; The treatment of scabies by the method of al-Rūm (the Romans or Byzantines) appears in a manuscript of Abū Bakr's treatise that is located in the Paris Bibliothèque Nationale. See, Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 194, n. 51.

²⁷ *Ibid.*, vol. II, p. 135.

²⁸ *Ibid.*, pp. 181, 223.

His use of phrases such as “from the cures of the ancients” refers mainly to medicines that he cites from Classical sources.²⁹

Although Abū Bakr uses general expressions that do not indicate a specific source, and does not mention the authors' names, the phrasing clearly indicates that these are written sources. An example of this is his use of the words “in another copy.”³⁰ To all appearances he refers to Greek-Byzantine traditions. In some cases, he refers to his use of other authorities but provides no information concerning the names of those authors. For example, with regard to cow disease (*dā' al-baqar*), which he describes as affecting many animals and causing severe diarrhea, Abū Bakr writes that this illness is discussed in some veterinary essays which state that it is an incurable disease that no animal can survive.³¹

Hunting and falconry treatises were another vehicle transmitting the ancient heritage. Some of these treatises, mainly from the Byzantine period, served as models for the early Arabic literature on falconry. Möller's comprehensive research on the subject proves, among other things, the Arabs' reliance on the Byzantine tradition in this sphere. His work is based on a comprehensive philological study of the texts that have survived in various manuscripts of the treatise. Möller quotes several passages from manuscripts of Arabic falconry treatises, all of which mention the name of Arsiganis the Wise. The hawking and falconry treatise of Adham-al-Ghaṭrīf mentions a certain Byzantine king (*malik al-Rūm*) as the first person who hunted with birds of prey.³² The list of sources that appears in Adham—al-Ghaṭrīf's introduction to his falconry treatise includes the name of Michael ben Leon, who is described as an important Byzantine personage. This Michael sent the Caliph al-Mahdī (158/775-169/785) a book on falconry, which bears the name of Arsiganis the Wise as one of its authors. In the falconry book, written by an author of Turkish origin named Bughdī b. 'Alī ibn Qushtumur, appear the words: “The sage Arsijānūs the Roman said in his book that was sent to al-Mahdī.”³³ Similar sentences appear in al-Asadī's book on hunting, and Möller concludes that the Arab authors believed that Arsijānūs was the original author of the book that was sent to al-Mahdī. It emerges from Möller's research that all the Arabic treatises on falconry preserved the name of Arsijānūs which they adopted from Adham-al-

²⁹ *Ibid.*, p. 305.

³⁰ *Ibid.*, p. 219.

³¹ *Ibid.*, p. 311.

³² Al-Ghaṭrīf, *Kitāb Ḍawārī al-ṭayr*, pp. 11, 12, 13, 14; Akasoy, “The Influence,” p. 53.

³³ Bughdī b. 'Alī Ibn Qushtumur, *Kitāb al-Qānūn al-wāḍiḥ*, Köprülü Kütüphanesi, Istanbul, Ms. No. 978, fol. 13r°.

Ghaṭrīf's book, and that his name in Arabic was generally spelled Arkhijānus, and sometimes with slight distortions, Arjinajīs and Arjisānīs. It appears that Arsījānūs was the Greek physician Archigenis who was known for his Arabic medical treatises and lived during the reign of Emperor Trianus (98-117) and before Galen (129-ca. 199). Another name that appears in Adham—al-Ghaṭrīf's book is Bilinās, usually Balinūs in Arabic literature, which apparently originated from al-Mahdī's Greek book and refers to Apollonius of Tyana (first century CE).³⁴

It may be assumed that veterinary knowledge retained certain characteristics that dated back to pre-Islamic periods and continued in the Muslim period in Mamluk Egypt. Not very much is known of the people who engaged in this profession, but in recent years researchers have uncovered more and more information on the veterinary tradition that extended from ancient times to Islamic Egypt and, in fact, to this day. Among the important evidence, it is worth noting the number of papyri that not only testify to the existence of hippiatry in Byzantine Egypt (324-640) but also reveal information concerning the payments for services provided on a large farm in Hermopolis. These payments included mainly six months' supply of food for the farm animals such as sheep, goats, cows and camels. A veterinarian named Isidorus is also mentioned in one of the papyri.³⁵ This evidence from the Byzantine period casts some light on a practise that certainly did not cease with the changes of regime, and it may be that a similar pattern of payment to veterinarians was retained in later periods under Islamic rule.

C. THE INDIAN HERITAGE

Very few scholars have discussed the Indian channel of influence on Arabic medical literature, although the Arabic sources state explicitly that a number of Indian doctors came to Baghdad during the reign of al-Ma'mūn (813-833) when he established the *Bayt al-Ḥikmah*. This group of Indian doctors and scientists contributed a great deal to the transmission of Indian knowledge to Arabic.³⁶ One of the Indians mentioned in the sources is Mankah, who served the Caliph Hārūn al-Rashīd (786-809) and cured him of an illness that he had contracted. This Mankah, in addition to his engage-

³⁴ See Möller, *Studien*, pp. 34-35.

³⁵ Τσακνάκης, *Ιστορία*, p. 150.

³⁶ See, for example, Max Meyerhof, "On the Transmission of Greek and Indian Science to the Arabs," *Islamic Culture: Hyderabad Quarterly Review*, IX (1937), pp. 17-29.

ment in medical practise, turned his hand to translation of medical treatises from the “Indian language” to Persian and Arabic. Another well-known figure from the sources is Šālih b. Bahlah the Indian, who also served Hārūn al-Rashīd and even substituted for the senior doctor Jibrīl b. Bakhtayshū’ during his absence from the caliph’s court.³⁷

There were also connections with India in the realm of veterinary medicine. Whereas the transmission of knowledge from the Greek heritage took place during one specific period and in one place (eighth to ninth centuries, Baghdad), the Indian influence resulted from the repeated journeys of Indian scholars who were converted to Islam and went on a voyage of learning, called in Arabic “*al-riḥlah fi ṭalab al-‘ilm*” (“a journey in search of knowledge”), during which they aspired to learn from the greatest scholars in the Muslim cities, including Cairo, and the names of the Indian scholars are mentioned in the sources of the Mamluk period.³⁸ All this indicate the continuity of the Indian influence over many years. The Arabic veterinarian treatises do not hide the fact that a certain medicine or a quotation was taken from Indian sources. Nevertheless, scholars are divided over the originality of these Indian treatises and it is hard to reach a conclusive solution on the matter.³⁹

³⁷ Ibn Abī Uṣaybi‘ah, *‘Uyūn al-anbā’*, pp. 475-477.

³⁸ Scholars of Indian origin who worked in the Muslim world were mostly known as *al-Hindī*, indicating their origin. Some of them acquired high status in theological and religious studies, and after they established their seat of learning in one of the cities, students came from all corners of the Muslim world to learn from them. Among the names mentioned we can find Šafiyy al-Dīn al-Hindī. See Ibn Ḥajar al-‘Asqalānī, *al-Durar al-kāminah*, vol. I, p. 301. Apart from the sphere of religion, we find the names of Indian scholars in various disciplines such as arithmetic, geometry, engineering, medicine, and various technological sciences, for example, one by the name of Muḥammad b. ‘Abd Allāh al-Hindī Shams al-Dīn al-Šafawī, who was reputed to be one of the greatest experts in the science of hourglasses. See Ibn Ḥajar al-‘Asqalānī, *al-Durar al-kāminah*, vol. III, p. 489. The relations with India were bilateral, and Muslims also went to India to study with eminent scholars there. Sometimes the sources note that those who traveled to India went dressed as paupers. See Ibn Ḥajar al-‘Asqalānī, *al-Durar al-kāminah*, vol. IV, p. 90. In this context, we need not expand here on Ibn Baṭṭūṭa’s journey to India and his description of Muslim scholars there. See Ibn Baṭṭūṭa, *Riḥlat*, pp. 428-462; Also, on Ibn Ḥajar al-‘Asqalānī, *al-Durar al-kāminah*, vol. III, pp. 480-481.

³⁹ Björck, saying that he does not wish to get involved in pseudo-epigraphic essays, remarks that the adoption of the name of the Indian Hippocrates in Arabic sources is more an expression of respect for the Indian wisdom than a matter of historical truth. He is also skeptical about Heusinger’s claim that “The famous Sanskrit essay ‘*Aswanān ūḥāda*’, which was translated into Arabic by Yūḥanān in the 9th century, and from Arabic to Latin in Sicily by an anonymous translator is the one known as the treatise of the Indian Hippocrates.” See Gudmund Björck, “Griechische Pferdeheilkunde in arabischer Überlieferung,” *Le Monde Oriental, Revue des Etudes Orientales* (Upsala) XXX (1936), pp. 1-12.

The Arab scholars mention the Indian doctors in various contexts. Ibn Abī Uṣaybi‘ah, for example, in his bibliography of Shānāq, who was of Indian origin, includes a book on veterinary medicine.⁴⁰ One of the outstanding figures mentioned in Arabic veterinary treatises was the aforementioned Indian Hippocrates, called in Arabic Buqrāt. This man, who operated in the sixth century, is a controversial figure due to the identification of his name with the Greek Hippocrates. We find in an Arabic manuscript that he claimed to be born in India and to have served the great Persian king, Khusraw. He wrote a treatise in Sanskrit on horse medicine that was translated into Greek and Arabic, and later into Latin by Moses of Palermo. According to Leclainche, this book adds nothing to previous knowledge.⁴¹ Björck poses two fundamental questions concerning the identity of the Indian Hippocrates and the ways in which veterinary knowledge was transmitted from the Greek to the Arab tradition. To answer the first question, he writes, one needs to look at Italy, since in all of the Christian West, only in Italy did literature on horses exist in the Middle Ages. The most prominent of these works was one that appeared in several versions in Italian and in one version in Vulgar Latin. In the Latin version the following sentence appears: “Hippocrates, the doctor from India, the wisest man, made this book.”⁴² At the end of the treatise appear the words: “This is what is written in the book of Hippocrates the wise on the treatment of diseases of horses that was translated from Arabic to Latin by the Magister Moses of Palermo.”⁴³ According to Björck, we can easily find in Ibn al-‘Awwām citations from the Indian Hippocrates that cannot be found in the Greek Corpus. In an attempt to clarify the identity of the Indian Hippocrates, Björck conducted a textual comparison of selected extracts from the French translation of Ibn al-‘Awwām which are explicitly ascribed to Hippocrates, with parallel extracts from the Latin version of the Indian Hippocrates that was translated from Arabic by Moses of Palermo.⁴⁴ The comparison shows that these extracts are similar, but Björck

⁴⁰ Ibn Abī Uṣaybi‘ah, *‘Uyūn al-anbā’*, p. 12; Ḥājī Khalifah, *Kashf al-ẓunūn*, vol. V, p. 9953.

⁴¹ Leclainche, *Histoire*, p. 112.

⁴² The Latin version was published in 1865 by P. Delprato in cooperation with L. Barbieri in volume 12 of the *Collezione di opere inedite o rare*. See Björck, “Griechische Pferdeheilkunde,” p. 2.

⁴³ Björck, “Griechische Pferdeheilkunde,” p. 2.

⁴⁴ According to Björck, Steinschneider successfully identified the period of Moses of Palermo, based on various archival sources. According to him, Moses of Palermo belonged to a group of professional translators who worked for Charles of Anjou, king of Naples and Sicily (1266-1285). The only evidence to contradict it is a manuscript with a dedication to the Norman King Roger II, who died in 1154. Björck thinks that the dates of Moses of Palermo

concludes that the translation by Moses of Palermo was not an exact translation but a summary of the book by the Indian Hippocrates.⁴⁵

We can also learn about the Indian Hippocrates from the prefaces of books attributed to him, which tell of a famous doctor who was expelled from his position by the king and one of his students took his place as court physician. The story goes that his student predicted the death of one of the king's confidants, and in order to actualize his prediction he put poison on the man's tongue while examining him. After this act of his student, Hippocrates swore that he would no longer engage in treating 'rational' creatures, switched to treatment of animals and acquired great esteem. He dedicated his veterinary book to the king who had dismissed him. The writer describes how Hippocrates wrote the book, quoting directly from him: "I wrote this book in brief based on my earlier books, on the books of Indian sages and on books written in the Armenian kingdom."⁴⁶ This may indicate that the sources of the Indian Hippocrates were mainly Indian veterinary treatises, but it is surprising to discover that he is also said to have used Armenian treatises (which will be discussed later). The question of Ibn al-'Awwām's Indian sources, particularly the Indian Hippocrates, cannot be completely solved without examining ancient Indian sources, especially those that were written and preserved in Sanskrit, but such an investigation is beyond the scope of this book.

Apart from Hippocrates, some other names of Indians appear in various contexts in Arabic veterinarian essays. One of these is Ḥannah al-Hindī, who is mentioned frequently by al-Ṣāhib Tāj al-Dīn, who provides the little

should be checked. The name of John of Damascus, to whom Heusinger attributes a ninth-century translation into Arabic of a Sanskrit book, appears in the titles of several manuscripts together with the name Hippocrates. Steinschneider claims that John of Damascus did not exist and was just a literary invention, and Björck believes that the Hippocrates who is mentioned together with the Damascene is not the Indian one. According to him, Delprato, who edited the translation of Moses of Palermo, provides significant proof that the author of those manuscripts was the Greek veterinarian Hierocles. See Björck, "Griechische Pferdeheilkunde," pp. 2-8.

⁴⁵ Björck writes that it is important to remember that the Latin version is a secondary one and that there are differences between the versions. An examination of the French translation of Ibn al-'Awwām leads him to the conclusion that Ibn al-'Awwām used the material of the Indian Hippocrates without explicitly stating his name. That is to say, the source used by Ibn al-'Awwām was not Greek but Arabic. Björck claims that this Arabic treatise is the one that Ibn al-'Awwām refers to as the treatise of the veterinarian Hippocrates. Björck does not know whether the treatise used by Ibn al-'Awwām is still extant in Arabic, therefore he recommends examining the manuscripts mentioned in Steinschneider's "Bibliography of Judaism." See Björck, "Griechische Pferdeheilkunde," p. 4.

⁴⁶ Björck, "Griechische Pferdeheilkunde," p. 5.

we know about him.⁴⁷ In a chapter discussing the colours and external markings of horses, al-Ṣāhib Tāj al-Dīn bases his arguments on the Indian tradition.⁴⁸ In the margin he adds a quote from another source, mentioning the name of Ḥannah al-Hindī, whom he describes as a vizier who functioned during the reign of the Indian king, Sijart.⁴⁹ Following Ḥannah, al-Ṣāhib describes the external signs by which one can determine whether a horse will win a battle or a race. He enumerates 20 signs on the horse's body that indicate good luck and guarantee victory to its master. It appears from this source, and from an examination of the corpus of Arabic veterinary writings, that the idea that markings or patches on the horse's body indicate the good or bad luck that it may bring to its master is characteristic of the Indian tradition.⁵⁰ It is interesting that al-Ṣāhib Tāj al-Dīn chose a title that emphasizes that these things are quoted from Indian sources: "Chapter on what the Indians said about the colours of beasts of burden, the round patches and the marks."⁵¹

The Indian tradition occupies an important place in the heritage of veterinary knowledge that passed into the hands of another Mamluk author, Abū Bakr. This tradition is evident mainly in passages that he quotes from the treatise of Ibn Akhī Ḥizām, who sometimes mentions his sources explicitly. For example, in a chapter describing external signs that indicate the nature of the horse and its attributes, Abū Bakr quotes Ibn Akhī Ḥizām's attribution of the material to "the wise men of India."⁵² In this case, the descriptions refer to the different colours of horses, and the author adds a note explaining the terms used and giving the parallel terms of his period. For instance, he mentions white horses, which the Indians describe as being of a similar colour to the birds called *Bayḍānī*, that is, lily white. To make it more comprehensible to his contemporaries, the Mamluk author describes the colour as *Marshūsh*—pied white. The description refers to a splendid and noble horse that is most suited for kings and rulers. A horse

⁴⁷ Al-Ṣāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 133.

⁴⁸ *Ibid.*, p. 131.

⁴⁹ *Ibid.*, vol. I, pp. 131-136.

⁵⁰ One example refers to a certain mark near the horse's axilla as a sign that its master will marry a bad woman who will hate him and keep away from him and even seek another husband instead of him. Other marks described by the writer may indicate good fortune for the horse's owner, his safe return from battle or failure to return, his relationships with his friends who leave him in time of trouble, his livelihood and how many children he will have. Al-Ṣāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, pp. 131-137. For a more detailed discussion of horse physiognomy, see Chapter V, E-2.

⁵¹ Al-Ṣāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 131.

⁵² "وقد ذكر ابن أخي حزام عن حكاء الهند" Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 289.

of this colour is also considered most efficient in battle and the horseman who rides him is assured of victory. The colour of another horse, described in the Indian sources as the colour of the flax flower, is explained by the Arab writer as green, adding "that is the colour known to us today." Abū Bakr again cites the Indians in a chapter describing the outward signs of horses that should be treated with caution and are better avoided,⁵³ and in discussing the characteristics and external signs of horse that indicate poor ability and unfitness for battle he bases most of his arguments on the Indian tradition. Although he does not name his Indian source, apparently it was translated into Arabic at an early stage of the Abbasid period. According to Abū Bakr, these Indian sources state that a horse is considered unfit for battle if its colour resembles that of a rat or wolf, monkey, elephant or lion. Sometimes the description refers to other physical signs, such as the stomach hair, the shape and number of the teeth, the scrotal hair, the colour of single hairs on the horse's forehead that differ from the general colour of its body, and similar small details that were considered by the Indians as signs of poor quality in the horse.⁵⁴

Clearly, both Abū Bakr and al-Ṣāhib Tāj al-Dīn also used indirectly materials derived from Indian sources which they found in earlier Arabic sources, particularly the treatise of Ibn Akhī Ḥizām. One example of this is a sentence that appears in the works of both and is quoted precisely from Ibn Akhī Ḥizām's treatise, declaring: "This has not passed the test of experience with me, and I have not drawn inferences or comparisons concerning it; nevertheless, I include in my book everything mentioned by the Indians, the Persians and the Arabs, so that my treatise will be complete."⁵⁵ It appears that the main difference between Abū Bakr and al-Ṣāhib Tāj al-Dīn in the matter of specifying their sources stems from their different approaches. Each of them belonged to a different group of writers. Al-Ṣāhib Tāj al-Dīn, who mentions his sources by name, belonged to a group of scholars who saw the collection of veterinary material as part of the scholastic literature on horses and furūsiyah, while Abū Bakr was one of a group of authors who also engaged in treating horses. Therefore, al-Ṣāhib's work, as he declares, consisted of gathering, collating and editing the materials, without intervening in the content or criticizing it. This, one may assume, is the reason why al-Ṣāhib was more punctilious than Abū Bakr in citing

⁵³ *Ibid.*, pp. 291-293.

⁵⁴ *Ibid.*, p. 293.

⁵⁵ "ولم يقع على هذا تجربتي ولا قياسي ولكنني أثبت هذا في كتابي جميع ما ذكرته الهند والفرس والعرب ليكن كاملاً"
": Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 293; al-Ṣāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 136.

the names and listing the sources that served him in collecting the material. Thus, Ḥannah al-Hindī is mentioned explicitly in his work. In contrast, Abū Bakr, the professional veterinarian who was knowledgeable in the material he quoted, did not attach importance to specifying names and early sources, and simply grouped them under a general heading such as 'Indian sources' or 'the sages of India'. Evidently, Abū Bakr took a more pragmatic approach to the contents themselves and saw the updating and adapting of the material to his period as more important than precise mention of the names of his sources and of earlier writers. Another explanation for the differences between these two approaches lies, perhaps, in the authors' use of different versions of Ibn Akhī Ḥizām's treatise.

Judging from the Arabic veterinary treatises, the Indian tradition may be credited mainly with highly developed pharmacological knowledge, based, among other things, on the meticulous use of poisonous substances, whether for medical treatment or for malicious purposes, as well as the use of antidotes. In addition, we find extensive discussion of the colour and shape of animals and external marks on their body that indicated their nature and destiny and the fate that awaited their masters.⁵⁶

Another important influence of the Indian tradition concerns the medical treatment of exotic animals. We know from many sources that it was not uncommon for Muslim rulers to collect exotic animals, which became the basis for menageries (as described in chapter I). It is reasonable to assume that the Arabs did not possess knowledge of medical treatment or routine care of exotic animals from Africa or the Indian subcontinent. Among the animals brought from India were elephants that were sent as gifts to the Muslim rulers. The Yemenite king, al-Malik al-Mujāhid (14th century), devotes the last chapter of his veterinary book to the care of elephants and emphasizes that only the Indians knew how to treat them. Indeed, these elephants that were given to the Yemenite rulers of the Rasūlid dynasty arrived along with experts from India who took care of them. Clearly, a long tradition of medicine and specific knowledge of the treatment of elephants was the specialty of these experts.⁵⁷

⁵⁶ Al-Ṣāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, pp. 131-136; Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 289.

⁵⁷ "And the elephant handlers from India and those whose descendants live amongst us who were born here in Yemen have knowledge of their illnesses and the ways of treating them." أهل الهند والمولدين عندنا منهم في اليمن معرفة بأمراضها وعلاجها. see al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 403.

An interesting aspect of the Indian veterinary knowledge was the early diagnosis of illnesses, which enabled them to diagnose a fatal disease that struck many horses in Yemen. Al-Malik al-Mujāhid remarks that only the Indians succeeded in determining at a very early stage whether the horse was suffering from a fatal illness by examining the horse's eyes, even before the first signs of illness appeared. They raised the horse's eyelids and if they found a yellowish colour in the eye sockets and pupils they could tell that the animal was suffering from a disease that would kill it within a few days.⁵⁸ The Indians are thus presented as more experienced in early diagnosis of diseases than Arab veterinarians.

D. THE PERSIAN HERITAGE

Several authors of veterinary treatises refer to Persian sources of information. These references generally appear in the introduction, without specific mention of the books' titles and their authors,⁵⁹ with the exception of a number of kings who are mentioned as sources of veterinary knowledge. For example, the Persian King Khusraw Anushiravan often appears in Arabic treatises, which also attribute to him other material belonging to the rich Persian tradition that preceded Islam.⁶⁰ Khusraw Anushiravan, Khusraw Bahrām the Great, son of Shapur, and others also appear often as figures who were very fond of hunting and knowledgeable on the subject.⁶¹

⁵⁸ Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 275.

⁵⁹ See, for example, a manuscript preserved in the Cambridge University Library بسم الله الرحمن الرحيم وبه تقى، روي عن علماء اليونان والفرس وغيرهم ممن يعانين علاج الخيل وقتيتهم وذلك مما جربه العبد الفقير الى الله تعالى هندي ابن مجد بن مجد الموصلي البيطار ولم يصغ فيه مالا جربه كل مصحح معه وجربه مرارا عديدة غير واحدة لينتفع به المعالج ليعظم الله الاجر لصاحبه والقابل به ان شاء الله تعالى باب دوا {الفرس المجنون} Cambridge University Library, Ms. Qq. 124, fol. 85v°. For citation of Persian scholars as sources, see al-Ṣāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, pp. 101, 102, 104, 108, 135, 145, 147.

⁶⁰ Khusraw Anushiravan, who reigned from 531-579, was a Sassanid king, son of Kavadh, who fought against Justinian and captured Antioch from him. In 555 he made a truce with the Byzantines, which enabled him to conquer Yemen in 570. This king was known for his love of the sciences and he was one of the great patrons of the translation project of literary and scientific works from Sanskrit to Persian. Among these books is *Kalilah wa-dimnah*, whose translation by Ibn al-Muqaffa' (d. 142/759) from Pahlavi Persian to Arabic was a landmark in the translation of literature to Arabic.

⁶¹ Khusraw II (Khosrau) Abrawiz, son of Hirmidh IV (Hormizd), was a Sassanid king (reigned 590-628) who rose to the Persian throne with the support of the Byzantines. He conquered Jerusalem in 614, but was defeated in a battle with Heracles, taken captive and murdered in captivity. This is the same Khusraw whose love for Princess Shīrīn was described by Firdawsī in his famous poem *Shāh-Nāmeḥ*. See Abū al-Qāsim al-Firdawsī, *al-Shāhnāmeḥ*,

This appears to be another example of the Muslim *Isnād* practise of attributing various matters to famous figures in order to enhance their importance, as mentioned earlier in connection with the Greek tradition. The veterinary material acquires added value though its attribution to kings and rulers.

The Persian tradition is mentioned by Abū Bakr in connection with the horses that belonged to King Khusraw Anushiravan, a familiar name in the Arabic sources who is associated with many spheres of knowledge that form the basis of the Persian heritage, at least as it was assimilated into the Islamic culture. In the introduction to his book, Abū Bakr quotes a saying by Khusraw Anushiravan, which is not really related to the veterinary sphere but sings the praises of learning and knowledge.⁶² He notes that he made use of an important Persian source describing the chronicles of the Persian kings, and mentions its title: "On the kings of Persia."⁶³ It appears from his words that he is referring to King Khusraw Anushiravan as a man who was expert in the care of horses. This appears in an anecdote that describes Khusraw as giving advice to the overseer of the royal stables and explaining what to do when a horse suffers from backache. The king said that in this case it was imperative to call a veterinarian to treat the horse, but if the overseer informed the king that the horse was suffering from problems with the hooves, the king said "to the slaughter," because he considered it to be an incurable illness. Abū Bakr's comment on this reflects his critical attitude toward information coming from ancient traditions: he argues that illnesses that affect the hooves are indeed severe types of illness, but they can be treated and the horses can be cured instead of being sent to be slaughtered.⁶⁴

trans. Al-Fath b. 'Alī al-Bundārī, Cairo-Kuwait: Dār Su'ād al-Ṣabbāḥ, 1993; 'Abd al-'Azīz Muṣṭafā Baqūsh, Shīrīn wa-Khasrū, Cairo-Kuwait: Dār Su'ād al-Ṣabbāḥ, 1992. Barhām was the name of six Persian kings of the Sassanid dynasty. The first (273-276), son of Hermez, had Mānī put to death. The second (276-293) fought against Rome. The fifth (421-438) persecuted the early Christians in his kingdom, which led to the intervention of the Byzantines. The sixth (590-591) fought against Khusraw II and was defeated. On the names of Persian kings in falconry treatises, see al-Ghaṭrīf ibn Qudāma al-Ghassānī (Eighth century AD), *Kitāb Dawāri al-ṭayr—The Book on Birds of Prey*, Facsimile Editions [ed. Fuat Sezgin, Series C, Vol. 25], Reproduced from *MS Aḥmad III No. 2099*, Topkapı Saray Library, Istanbul, Frankfurt am Main: Institute for the History of Arabic-Islamic Science at the Johann Wolfgang Goethe University, 1986 {e. g. pp. 12, 15, 21, 24}.

⁶² Abū Bakr al-Bayṭār quotes from Kisrá anū Shirwān (Khusraw Anushiravan): "If God wants the good of a nation, He grants wisdom and knowledge to their kings." See Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 53.

⁶³ *Ibid.*, vol. II, p. 63.

⁶⁴ *Ibid.*

We can also learn about the Persian tradition from a treatise by the eleventh-century King Qābūs al-Muwālī, who reigned in the Ghilān region on the shores of the Caspian Sea. This king wrote a treatise for his son summarizing the veterinary knowledge of his time. The book served as a kind of moral testament, telling the prince what he needed to know in many spheres of life. The 25th chapter is devoted entirely to horses, and deals, among other things, with their health and methods of treating their ailments. In point of fact, it is not certain that this book is a summary of all the Persian knowledge on the subject, and it may possibly include other material that was translated from Arabic. The book was translated into Turkish several times (in 1421, 1431 and 1705). Von Diez, the Prussian envoy in Istanbul, translated it into German between the years 1784-1790. He sent a copy to the poet Goethe, who was highly impressed and expressed his disappointment that the book was not well known in the West. He even wrote a poem praising the Persians' treatment of horses, as presented in the book. In 1866 the book was translated into French based on the Persian edition that came out in Teheran in 1868.⁶⁵

At any event, information from Persian sources was assimilated in Arabic veterinary treatises, as may be seen from the many Persian words in the texts, such as the names of months from the Persian calendar, names of medicines, and so forth.⁶⁶ The knowledge generally refers to the description of external characteristics of horses or falcons. There is also a great deal of material related to pregnancy and foaling. The Arab authors generally cast doubt on this information, especially in the case of techniques designed to influence the sex of the foal, its colour and its attributes. They express their doubt in phrases such as "the Persians claimed."⁶⁷

In the hawking and falconry treatise attributed to Adham-al-Ghaṭṭrīf, "The Book of the Persian" (*Kitāb al-Furs*) is mentioned among several other books attributed to various peoples.⁶⁸ Most of the authors of Arabic falconry books, which also deal with medical treatment of falcons, are

⁶⁵ Leclainche, *Histoire*, p. 113.

⁶⁶ The Yemenite king al-Malik al-Mujāhid quotes a saying from the Persians, who argue, according to him, that the best time for impregnating mares is the month of *Ādār māh* up to the seventh night of the month *Asfīdār māh*. The author chose to cite the names of the months according to the Persian calendar, in which *Ādār māh* is the 9th month. The Iranian calendar begins on November 22, and *Asfīdār māh*, the 12th month, begins on February 20. See al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 189.

⁶⁷ See, for example al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 189.

⁶⁸ Al-Ghaṭṭrīf, *Kitāb Ḍawārī al-ṭayr*, pp. 2, 20, 156, 158 etc.; Akasoy, "The Influence," p. 54. Akasoy also cites some lines of *Qābūs-nāmeḥ*, the eleventh-century Persian "mirror of princes," dealing with the question in which hand one should hold the hawk. See *Ibid.* p. 51.

preoccupied with the question of primacy and endeavor to determine who was the first person to succeed in taming and hunting with falcons, hawks, and other predatory birds. Ibn Mankalī, for example, ascribes the early hunting with a falcon to one of the Persian kings, but this is questioned by many.⁶⁹

E. THE ARMENIAN HERITAGE

The name of the Armenians appears only a few times in al-Šāḥib Tāj al-Dīn's veterinary book, and then mainly in the margins. It should be emphasized that this heritage is rarely encountered in Arabic literature, and in fact al-Šāḥib Tāj al-Dīn's treatise is one of the few containing material attributed to Armenians in the context of horse treatment. According to this manuscript, the Armenian tradition is connected mainly with zoology and provides basic information on animals, the essence of which refers to the description of external signs by which to choose a good horse. It is not clear whether al-Šāḥib Tāj al-Dīn used early Armenian sources or whether these were Arabic sources that were later translated into Armenian. The Armenians are mentioned in other studies dealing with Ibn al-ʿAwwām's sources. The scholars describe how a treatise by a certain Anatolius came into the hands of the Arabs, noting that it was translated into Syrian by Sergius of Rozina in the 6th century CE, and later translated from Syrian to Arabic. In the 12th century, it appeared in an Armenian version, which was later translated into Arabic. All these translations are collated by Ibn al-ʿAwwām in his large book on agriculture, *Kitāb al-Filāḥah*.⁷⁰

Abū al-Faraj, the author of a veterinary treatise that is preserved as a manuscript in the Dār al-Kutub Library in Cairo, states in his introduction that it was translated from Armenian to Arabic by the Armenian Maḥbūb [al-Armanī] and his friend [colleague?] Abū al-Faraj; the translation was done by instruction and funding of Maḥmūd b. Khalīfah Yaʿqūb and the philosopher Saʿd al-Dīn b. Zāhir al-ʿAjāmī, apparently during the reign of

⁶⁹ {و لم يجد لها دليلا قطعيا ولم تتج في محليتي} see Ibn Mankalī, *Kitāb Uns al-malā*, p. 193. For the various sources stating that it was a Byzantine or Persian tradition, see al-Masʿūdī, *Murūj al-dhahab*, vol. I, p. 301; al-Ḥasan al-Bāzīyār, *al-Bayzara*, p. 40; al-Nāshirī, *Intihāz al-furaṣ*, p. 47; al-Nuwayrī, *Nihāyat al-arab*, vol. X, p. 188; Kushājīm, *al-Maṣāʾid wa-al-maṭārid*, p. 49; al-Zaynabī, *al-Qawānīn al-sultānīyah*, p. 80; al-Asadī, *al-Jamharah fi al-bayzarah*, p. 66; al-Baladī, *al-kāfi fi al-bayzarah*, p. 115; Ibn Mankalī, *Kitāb Uns al-malā*, p. 191 (note 1).

⁷⁰ Leclainche, *Histoire*, p. 112.

Sultan al-Zāhir Baybars (1260-1277).⁷¹ As with materials originating in the Persian tradition, the authors note that some expressions preserved in the book, such as the names of medicines, are Armenian.⁷² Above all, al-Ṣāhib Tāj al-Dīn's book is rich in quotations attributed to the Armenians, particularly in text that appears in the margins, written in a special calligraphic script.⁷³

While the Armenians' contribution to Arabic the hippiatric writings is not extensive, we find interesting material in falconry treatises that appears to come from Armenian sources. This is not surprising since Armenia is the country of origin of the falcons that were considered the most splendid and expensive, known in Arabic as Ṭaḡhrīl.⁷⁴

F. THE TURKISH HERITAGE

The Turks are also rarely mentioned in Arabic veterinary treatises, and when they are mentioned it is not clear whether the material dates back to an early Turkish tradition that was preserved in various writings or whether it belongs to later periods. An examination of the content reveals that it does not add very much to the veterinary knowledge belonging to other traditions, and barely refers to medical practises. Unlike the dominant presence of the Greek, Indian or Persian traditions in Arabic hippiatric treatises, the names of Turkish authors or titles of Turkish treatises are totally absent. Furthermore, the little that is mentioned on Turkish veterinary writing on horses may come from early Arabic sources that were gathered in the ninth and tenth centuries, like the works of Ibn Akhī Ḥizām, which were translated into Turkish at a later stage.⁷⁵

Most of the few references to the Turkish tradition are connected with falconry, the types of birds used in hunting, and their diseases.⁷⁶ The only name mentioned explicitly in the Arabic sources is that of the Turkish King,

⁷¹ Fu'ād al-Sayyid, *Fihrist al-makḥṭūṭāt* (Nashrah bi'l-makḥṭūṭāt allatī iqtanathā al-Dār sanat 1936-1955), Cairo, 1961, vol. I, p. 305. See also Ullmann, *Die Medizin im Islam*, pp. 220-221.

⁷² E. g. the medicine called *dānqist*, B.L., Ms. ADD. 23, 417, fol. 36v°.

⁷³ E. g. Al-Ṣāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, pp. 82, 98, 99.

⁷⁴ Al-Ghaṭrīf, *Kitāb Ḍawārī al-ṭayr*, pp. 16-17, 31.

⁷⁵ Tülay Artan, "Ahmed I and "Tuhfet'ül-mülûk ve's-selâtin": A Period Manuscript on Horses, Horsemanship and Hunting," *Animals and People in the Ottoman Empire*, ed. Suraiya Faroqhi, Istanbul: Eren, 2010, pp. 235-269.

⁷⁶ Al-Ghaṭrīf, *Kitāb Ḍawārī al-ṭayr*, pp. 2-3, 21; al-Baladī, *al-Kāfi fi al-bayzarah*, pp. 78, 79, 87, 115, 202, 259.

Khaqān, who is quoted in statements that reveal his expertise in diagnosing and treating illnesses of falcons.⁷⁷

We find a few references to Turkish knowledge that was handed down by word of mouth and used by soldiers of Turkish origin in Mamluk Egypt. Such knowledge was generally related more to ways of guarding the horse's health than to actual medical treatment. The information derived from the Turkish tradition that appears in hunting and falconry books mainly concerns methods of combat, horse riding, carrying a falcon in the right or left hand, rules of etiquette during the hunt, the use of certain weapons, clothing, and so forth. Ibn Mankalī, for example, describes how he learned from a Turkish soldier how to repair a bow and arrow quickly during the hunt.⁷⁸ Material of this kind found its place in the Mamluk veterinary treatises.

G. THE PRE-MAMLUK ARAB HERITAGE

1. *Jāhiliyah and Early Islam*

The *Jāhili* way of life is noteworthy for its intensive relations with animals. In contrast to the prevalent opinion on nomadic tribes whose life is bound up with the constant search for sources of water, this was a sedentary Arab culture with permanent centres of settlement. The Arab culture inherited by Islam was centred on cities that were important trade centres and constituted the hub of the economic, cultural and religious life of the Arabian peninsula, especially the two cities Mecca and Medina. The former, at least in the 100 years preceding Islam, was the religious capital of all the tribes in the Arabian Peninsula, and many people went there on pilgrimages. Animals were almost the sole means of transporting goods to Mecca and Medina. They were also necessary for making trade journeys from south to north, and their mention in the Koran (the winter trip and the summer trip) is evidence of their importance.⁷⁹ Nor should we underestimate the

⁷⁷ In al-Ghaṭrīf's book, Khāqān is mentioned as the Turkish king who introduced methods of diagnosing the medical condition of falcons and other hunting birds. The author emphasizes that Khāqān was very knowledgeable on the subject of hunting, knowledge acquired from his experience and great love of the subject. See al-Ghaṭrīf, *Kitāb Ḍawārī al-ṭayr*, pp. 21, 31, 46-47. See also the article by Möller, who states that a manuscript (*Sarāy* 2099.3) located in Istanbul, refers to Khāqān as the first king who hunted using hawks. Möller, *Studien*, p. 34. See also: Köprülü Kütüphanesi, Istanbul, *Ms. No.* 978, fols. 13v^o, 22r^o; al-Baladī, *al-Kāfi fi al-bayzarah*, pp. 87, 115.

⁷⁸ Ibn Mankalī, *Kitāb Uns al-malā*, p. 69.

⁷⁹ (إيلافهم رحلة الشتاء والصيف) Koran, 106:2 (*Surat Quraysh*).

importance of animals among the tribes that did not live in or near the two cities and spent their lives wandering in desert regions.

The bustling commercial life of Mecca and Medina was the background for pre-Islamic cultural activity, particularly *Jāhili* poetry. The *Qaṣā'id* (stylized poems with meter and rhyme) written by the greatest poets in the whole Arabian peninsula, glorying in their status, their battles and their victories, just as they gloried in their love and longing for the places they had left, also related to animals. The relationship between the *Jāhili* poet and his horse finds expression in many of the poems that have survived from that period, such as those of Imru'ū al-Qays, al-Nābighah al-Dhibyānī, 'Antar b. Shaddād, 'Abīd b. al-Abrāṣ, and more.⁸⁰ The intimate connection between the poet and his animal that is described in pre-Islamic Arabic poetry constitutes a boundless source of rich linguistic material that provided Islamic authors with endless material for hundreds of essays. The many lexicons in which Muslim Arab authors collected literary materials (poetry and prose) in order to preserve the *Jāhili* heritage were the cultural masterpieces of the first generations of Islam. This project dealt with the gathering of verses of poetry and any accompanying material, whether interpretations of the verses or stories and anecdotes based on the poetry.⁸¹ Some writers devoted special essays to the subject of animals' names, enumerating dozens, and even hundreds, of synonymous names for a certain animal.⁸²

The *Jāhili* linguistic heritage enabled later writers to transform the foreign material into an integral part of the Islamic culture.⁸³ The many descriptions of animals that were the basis of the ancient Arab tradition provided the rich language that later enabled the authors of veterinary literature to deal with the wealth of information that reached them from

⁸⁰ See Nurī Hammūdī al-Qaysī, *al-Furūsiyyah fī al-shī'r al-jāhili*, Baghdad: Maktabat al-Nahḍah, 1964, 136-164; Aḥmad Abū Yahyā, *al-Khayl fī qaṣā'id al-jāhiliyyīn wa-al-islāmiyyīn*, ed. Yāsīn al-Ayyūbī, Sidon-Beirut: al-Maktabah al-'Asriyah, 1997, pp. 19-26.

⁸¹ Goldziher, *A Short History*, pp. 23-31.

⁸² For example, al-Aṣma'ī, *Kitāb al-Wuḥūsh*; Ibn al-Kalbī, *Kitāb Nasab al-khayl fī al-jāhiliyyah wa-al-islām wa-akhbārīhā*; Ibn al-A'rābī, *Asmā' khayl al-'arab wa-fursānīhā*; See also Carl Brockelmann, *Geschichte der Arabischen Litteratur*, Leiden: E.J. Brill, 1949, vol. II, pp. 147-151; Shams al-Dīn Abū al-'Abbās Aḥmad b. Muḥammad b. Abī Bakr Ibn Khallikān, *Waḥayāt al-a'yān wa-anbā' abnā' al-zamān*, ed. Iḥsān 'Abbās, Beirut: Dār Ṣādir, 1969-1970, vol. III, pp. 170-176 (al-Aṣma'ī), vol. V, pp. 235-243 (Abū 'Ubaydah Mu'ammār b. al-Muthannā).

⁸³ On descriptions of horses in the *Jāhili* poetry, see, for example, *Dīwān Imrī' al-Qays*, pp. 87, 121, 163, 166, 193, 1233; *Dīwān 'Abīd*, p. 117; *Dīwān 'Alqamah*, p. 422; *Dīwān Abū Dā'ūd*, pp. 288, 299, 335; *Dīwān Labīd*, p. 21; *Dīwān al-A'shā*, pp. 53, 187, 285; *al-Mufaḍḍalīyāt*, vol. I, pp. 35, 2: 56, 214, etc.

various sources and incorporate it into Arab culture. As well as names of animals, the classical Arabic writings also name the different parts of their bodies. This information was of great help to authors of Arabic veterinary literature in describing animals' bodies, and to veterinarians in studying their anatomy. In this context, we can quote an anecdote concerning two authors who were tested by the caliph on their expertise in the subjects included in their books. Al-Aṣma'ī defeated Abū 'Ubaydah, pointing to every part of the horse's body and saying its name aloud in front of the ruler. Abū 'Ubaydah, who failed in the test, told the caliph that he was not a veterinarian and therefore did not presume to know the body parts he wrote about in his book.⁸⁴ Hammer-Purgstall's work on the camel is a rich philological study that faithfully reflects the Arabs' linguistic contribution to veterinary science.⁸⁵

The knowledge we possess concerning the *Jāhili* and early Islamic veterinary medicine is scanty, based mainly on fragments of information in verses from epic poems, particularly from the *Mu'allaqāt* as well as fables and anecdotes from this early tradition.⁸⁶ A veterinarian named 'Āṣ ibn Wā'il is also mentioned in Mecca in the times of the Prophet Muḥammad.⁸⁷

Most of the veterinary care in the *Jāhili* period focused on camels and horses, which were the mainstay of people's lives, the basis of their livelihood and their desert journeys. The major illnesses whose treatment is described were skin diseases, particularly scabies. The *Jāhili* corpus contains many references to this disease and its treatment, based on the use of a type of natural tar (*qaṭrān* or *qatirān*), which is obtained from tree resin and differs from the liquid tar known as *qār*.⁸⁸ These methods of treatment

⁸⁴ See Ibn Khallikān, *Wafayāt al-a'yān*, vol. III, pp. 172, vol. V, p. 237; al-Dimyāṭī, *Faḍl al-khayl*, [the Introduction of the ed. -Muqadimat al-Nāshir], pp. 3-4; al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 87.

⁸⁵ Hammer-Purgstall, "Das Kamel," pp. 1-104.

⁸⁶ See, for example Ibn Hudhayl, *Hilyat al-fursān*, pp. 109-114. A frequently quoted saying in veterinary literature that emphasizes the importance of the horse to the Arab in the *Jāhili* period refers to the blessings that were customarily said in various circumstances. The saying determines that the Arabs blessed one another on three occasions: the birth of a son, a poet proving his talent, and the birth of a foal. See Abū Yahyā, *al-Kahyl fī qaṣā'id*, p. 40; Ibn Rashīq, *Kitāb al-'Umdah*, vol. I, p. 29.

⁸⁷ Robert G. Hoyland, "Theomnestus of Nicopolis," p. 152.

⁸⁸ Ibn Manẓūr In his classical dictionary mentioned some *Jāhili*'s poets like Labīd and Imru' al-Qays, which had been mentioned in their poems the word *qaṭrān* or *qatirān* for treating animals. See Ibn Manẓūr, "q-ṭ-r," *Lisān al-'arab*, vol. V, p. 105. *Qaṭrān* a type of tree resin that is processed for spreading. *Qār* is asphalt. The Andalusian scholar Ibn al-Bayṭār defines *qaṭrān* as the resin from a tree called *sharbīn*. According to him, *qaṭrān* was widely used in medical treatments throughout the Middle Ages. He describes how they prepared

continued to be used during the early Islamic period (period of the Prophet and the first Caliphs 610-661), and also afterwards, in the Umayyad period (661-750). Other methods used in the *Jāhili* Arab society were cauterizing with hot iron and special diets. It is not clear whether they used bloodletting for treating animals, although we know that it was widely used in later generations. It may be assumed that the methods of treating animals in the Arabian Peninsula during the *Jāhili* period were similar to those used on humans. The terms '*bayṭarah*'—veterinary science, and the name '*Bayṭār*'—animal doctor, were already in use at that time.⁸⁹ Some of these methods are still used today.⁹⁰

The body of knowledge accumulated through trial and error and transmitted orally by Arabs in the *Jāhili* period and the early days of Islam contributed to the professional treatises that were written at a later stage. This tradition of transmitting knowledge by word of mouth persisted into later periods; this is attested in the writings that refer to knowledge derived from members of one Arab tribe or another.⁹¹

the medication by boiling the resin over a low flame. When it cooled it became a dry black substance which the people of Babylonia, Syria and Maghreb countries call "*zift*"—tar. Ibn al-Bayṭār lists most of the treatments and describes the different methods of using this substance. He stresses mainly treatment of humans, but also mentions treatment of animals. For example, he says that spreading it on the animal's body is an effective treatment for lice and ticks. He adds a note that this is also effective for treating children who have lice. Another treatment mentioned is spreading it on the skin as a repellent for mosquitos and flies. This source states that even the ignorant learned from extensive experience with the use of wet tar that it is effective for treating wounds sustained by animals and flocks of sheep during shearing. As stated, this substance was widely used in treating humans, e.g., for abortions, stomach parasites, contraception, toothache, eye, throat, stomach and menstrual problems, and for aborting a dead foetus. In the case of animals, he mentions its use for treating scabies, which affect sheep and dogs. See Ḍiyā' al-Dīn Abī Muḥammad 'Abd Allāh b. Aḥmad Ibn al-Bayṭār al-Andalusī al-Māliqī (575-646 H/1197-1248), *al-Jāmi' li-mufradāt al-adwiyah wa-al-aghdhīyah*, Beirut: Dār al-Kutub al-'Ilmiyah, 1992, vol. III, pp. 80-82 (*sharḥ*).

⁸⁹ See, for example, the verse of a poem by the *Jāhili* poet al-Nābighah al-Dhibyānī, who is mentioned in a note in the introduction to the work: "شكّ الفريضة بالمدرى فانفذها طعن الميطر" *Ḍiyād b. Mu'awīyah al-Nābighah al-Dhibyānī*, *Dīwān al-Nābighah al-Dhibyānī*, ed. Karam al-Bustānī, Beirut: Dār Ṣādir, 1963, p. 32.

⁹⁰ Scabies is treated to this day in the Arabian Peninsula and in many Muslim countries as well as in the Tunisian Sahara with traditional cures that were popular in the Middle Ages, such as the use of tar and traditional methods of cauterizing with a hot iron. On these methods see, Gilbert, J.M. Claus, "Camel Diseases and the Traditional Methods of Treatment in Use among the Ghib Camel Breeders of the North-Western Tunisia Sahara," *Al-Ma'thūrāt al-sha'bīyah*, XXXIV (April, 1994), pp. 7-25.

⁹¹ The author of a veterinary treatise describes meeting the members of the 'Ubādah Arab tribe who belonged to an Arab tribe of Muqbil, and learning from them a method of

In the Islamic medical tradition, especially at its beginning, great importance was ascribed to what was known as 'the Prophet's medicine', and many later medical and scientific texts in Islam credit Muḥammad the Prophet with detailed knowledge of all kinds of treatments. This literary genre, known in Arabic as *al-Ṭibb al-Nabawī*, is based mainly on legends that tell how the prophet treated some illness or another. In particular, they speak of spiritual healing, but texts on distinctly medical matters can also be found in those works.⁹² It is interesting to note that material based on the tradition of the Prophet's medicine did not find a place in the Arabic veterinary treatises, despite the assumption that his attitude to animals was positive, as reflected in many traditional sayings expressing his compassion and mercy for animals.⁹³ Nor does the Koran contain any kind of professional veterinary material. Nevertheless, verses quoted from the Koran appear in professional veterinary literature, particularly verses describing the roles that certain animals are destined to fill for the well-being of humans.⁹⁴ Interestingly enough, many of the Koranic verses bear the

treating a certain disease. See Cambridge University Library, Cambridge, Ms. Qq. 124, fol. 122v^o.

⁹² See, for example, Aḥmad 'Abd al-Rāziq Aḥmad, *al-Ḥaḍārāh al-islāmīyah—al-'ulūm al-'aqlīyah*, pp. 144-145. Among the works written on the Prophet's medicine are Ibn Qayyim al-Jawziyah, *al-Ṭibb al-nabawī*, ed. 'Abd al-Ghanī 'Abd al-Khāliq, Cairo, 1983; al-Dhahabī, *al-Ṭibb al-nabawī*, Cairo, 1306 H.; al-Suyūṭī, *al-Raḥmah fī al-ṭibb wa-al-ḥikmah*; al-Ḥamawī, *al-Aḥkām al-nabawīyah fī al-ṣinā'ah al-ṭibbiyah*, Cairo, 1373 H. In our day, too, we find many works that present the Prophet Muḥammad as a doctor who was expert in treating various diseases. See, for example, Ḥusām al-Rāwī, *al-Rasūl al-ṭāib*, Beirut: al-Intishār al-'Arabī, 1999.

⁹³ The Hadith literature cites many traditional sayings that indicate the Prophet's positive attitude to animals. See, for example, "دخلت امرأة النار في هرة ربطتها فلا أطمعتها ولا هي" 'رسلتها' Abū Zakariyā Yaḥyā b. Sharaf al-Nawawī (d 676 H), *Sharḥ al-Nawawī 'alā Ṣaḥīḥ Muslim*, Beirut: Dār Iḥyā' al-Turāth, 1392 H, vol. IV, p. 240; *Sunan Ibn Mājah*, vol. I, p. 402 (Hadith 1265); vol. II, p. 1241 (Hadith 4256); *Sunan al-Nassā'ī*, vol. III, p. 149 (*wa-fī kull kabid raṭba*); *Tafsīr al-Qurṭubī*, vol. VII, p. 216. Al-Jāhīz quotes a story related by the Prophet concerning a woman whom God forgave for her sins because she showed compassion for a thirsty dog and gave it water to quench its thirst. See al-Jāhīz, *Kitāb al-Ḥayawān*, vol. II, p. 297. Another story describes how the Prophet gave water to a thirsty cat with his own hands. See Aḥmad 'Abd al-Ḥalīm Ibn Taymiyya al-Ḥurāzī Abū al-'Abbās, *Sharḥ al-'umdaḥ*, ed. Sa'ūd Ṣāliḥ al-'Uṭayshān, al-Riadh: Maktabat al-'Ubūkān, 1413, vol. I, p. 88.

⁹⁴ The Koranic verse that appears most commonly in veterinary literature refers to the role of horses, mules and donkeys for riding and for show (والخيل والبغال والحمير لتركبوها وزينة), *Koran*, 16: 8 (*Sūrat al-Naḥl*). See al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 368. In addition, the use of horses in warfare appears in some verses that are often quoted in veterinary literature. For example, the verse (وأعدوا لهم ما استطعتم من قوة ومن رباط الخيل ترهبون به عدو الله) 'وأعدوا لهم ما استطعتم من قوة ومن رباط الخيل ترهبون به عدو الله'—And prepare against them whatever you are able of power and of steeds of war by which you may terrify the enemy of Allah and your enemy', *Koran*, 8: 60 (*Sūrat al-Anfāl*).

names of animals, such as the ants, the cow, the beasts, the bees, the spider, the elephant, and so forth. The Koran was an important source of inspiration in everything concerning animals, especially animals that were used in Muslim society. Many verses say that animals give great pleasure to the believer who receives them from God as a reward for his faith. Some verses say that animals, like humans, are creatures whose welfare is of concern to their Creator.⁹⁵

In Mamluk veterinary treatises, Islamic tradition is cited mainly in connection with Jihad, a subject that became a significant part of many veterinary essays, especially in chapters dealing with *furūsiyah*. The Islamic heritage, the sayings of the Prophet (the Hadith) as well as verses from the Koran, in addition to the range of traditional sayings of important figures from the beginning of Islam who had become in the course of time authoritative and reliable sources of knowledge, all these combined to form the basis of some of the contents of veterinary books. It would be no exaggeration to say that they constitute significant parts in entire chapters of veterinary books, as in the case of al-Šāhib Tāj al-Dīn and Abū Bakr, whose books are based partly on the Arab heritage, whether *Jāhili* or early Islamic.⁹⁶ Al-Šāhib Tāj al-Dīn, for example, devotes the first part of his book to *furūsiyah*, in the context of Jihad. It is not surprising, then, to discover that this part of the book is replete with quotations from the Islamic tradition, the aim being to praise those who were prepared to dedicate their wealth and strength to the holy war. By using religious sources, al-Šāhib Tāj al-Dīn sought to show the importance of going to fight a holy war as part of the

See, for example, Mu'allif Majhūl, *al-Jawād al-'arabī*, p. 24; Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 69; al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 84.

⁹⁵ —وما من دابة في الأرض الا على الله رزقها) 'And there is no creature on earth but that upon Allāh is its provision', *Koran*, 11: 6 (*Sūrat Hūd*).

⁹⁶ Abū Bakr devotes the first chapter of his book to the importance of fighting holy wars (*jihād*). He backs up his argument with verses from the Koran, many sayings of the Prophet, and verses from *Jāhili* poetry. See Abū Bakr al-Bayṭār, *Kāshif*, vol. I, pp. 69-75. Al-Malik al-Mujāhid also includes much Islamic content in his veterinary book. Like al-Dimyāṭī, who wrote a book about the advantages of horses, he devotes all of his first chapter to the praise of horses, based mainly on verses from the Koran and on the Hadith tradition. Other chapters in the book include similar material, and there he quotes traditions relating to animals that the Prophet possessed, mentioning donkeys, mules, camels and horses. The horse had senior status, but the other animals were not ignored. Both the Koran and the Hadith attach importance to keeping animals in the home. Some traditions even maintain that keeping a noble horse in the home can avert evil and prevent the devil from entering: "The devil cannot trick a person who keeps a noble horse in his home." (ولا يخبل الشيطان أحدا في داره فرس) (عتيق), See the manuscript of al-Dimyāṭī, *Faḍl al-khayl*, B.N., Ms. Arabe 2816 (Suppl. ar. n.º. 992), fol. 20rº.

Islamic religious obligation. Among other things, the text includes a description of the way a cavalier should treat his horse, based on traditions that tell of the Prophet's treatment of his horses.⁹⁷ Referring to early Islamic traditions, al-Ṣāḥib Tāj al-Dīn also discusses the rights that are due to the horse owner who goes to battle with his horse, stating what percentage of the booty he is entitled to, compared with a fighter who goes to battle without a horse. We can learn about the horse's status in the context of Jihad from one much quoted saying concerning the reward that a person will receive on the Day of Judgment for harnessing his horse to the Jihad war. The saying goes that the overall weight of such a person's good deeds will be augmented by the overall weight of the food he supplied to his horse during its lifetime, the weight of the water it drank, the weight of the urine it secreted, and even the weight of its faeces. All these elements will be weighed in the balance when assessing the believer's good deeds on the Day of Judgment.⁹⁸ Al-Ṣāḥib Tāj al-Dīn's book is based not only on Islamic but also on pre-Islamic tradition, which occupies a prominent place in the book. It may be said that the Islamic tradition that praised the horse in holy war was, in fact, a direct continuation of early Arab tradition, which lauded the place of the horse in the *Jāhili* society. The author notes that the horse possesses very high status in this society, since it is the symbol of honor, beauty, pleasure and the ability to give its owner an advantage over his enemies. Hence, it is said that the *Jāhili* Arab was prepared to go to bed with an empty stomach in order to give the little food he had to his horse. The horse came first in order of preference, and ranked even higher than himself, his wives and his children.⁹⁹ To illustrate this, Tāj al-Dīn quotes some verses in praise of the horse from the *Jāhili* traditional writings. He generally mentions the names of the poets, some of whom were among the most important and admired poets in the *Jāhili* tradition and those known as *Mu'allaqāt*, such as 'Antarah b. Shaddād, Labīd b. Rabī'ah and Imru'ū al-Qays. Al-Ṣāḥib adds an interpretation of the verses quoted, following the custom of classical *Adab* literature.¹⁰⁰

Like al-Ṣāḥib Tāj al-Dīn, Abū Bakr bases the first part of his veterinary treatise mainly on the Arab heritage, whether *Jāhili* or Islamic. In addition to the aforementioned treatise of Ibn Akhī Ḥizām, he quotes parables from

⁹⁷ One story relates that the Prophet Muḥammad stroked his horse's head and forehead, saying that goodness was contained in the forehead of horses until the Day of Judgment. See al-Ṣāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 46.

⁹⁸ *Ibid.*, p. 55.

⁹⁹ *Ibid.*

¹⁰⁰ *Ibid.*, vol. I, pp. 55-67.

Adab literature, sayings from the scriptures, sayings of the Prophet, verses from poems belonging to the *Jāhili* and Islamic culture, and more.¹⁰¹ Apart from describing the importance of the horse and praising its noble character, Abū Bakr's book deals mainly with zoology, relating mostly to horses, donkeys and mules. It contains comprehensive information on terms related to the horse, such as its sex, breed and type, the names of its organs, its joints, defects, illnesses, and colours, as well as on equestrian terms, such as the harness, headpiece, the reins, the bridle, the curb bit, the hook, the saddle, the buckle, and the stirrups.¹⁰² The discussion of horses' colours plays an important part, based on the Arab tradition that determines which horses are best for racing. Again, Abū Bakr supports his statements by citing Arab traditions and sayings from the Hadith.¹⁰³

Treatises on falconry also include a great deal of material based on early Arab traditions. Hunting treatises emphasize the subject of ritual purity of the meat of the prey. The authors present detailed discussions, mainly theological, concerning the permission to eat the prey. The *Jāhili* and the Islamic traditions that are cited in these treatises include early Arabic poetry, verses from the Koran and sayings from the Hadith, the *Adab* literature, and speeches by famous personages. In addition, collections of religious decrees, *fatāwā*, also occupy an important place and are used extensively by some of the authors of hunting literature.¹⁰⁴

Al-Nāshirī's book on hunting is one example of the wide use of the Islamic Arab tradition. His book comprises eight chapters, each devoted to a subject based on one of the important Islamic sources: "Chapter 1 describes the Koranic verses related to hunting; Chapter 2, the Hadith; Chapter 3, the names of prophets, companions of the Prophet, caliphs and kings whom Islamic Arab traditions associate with hunting; Chapter 4, names of hunting birds; Chapter 5, names of hunted animals; Chapter 6, the religious decrees and Islamic laws concerning hunting; Chapter 7, speeches and

¹⁰¹ For example, in a chapter on the red colour of the horse, he refers to various sources such as expressions of praise by the Arabs, meaning the *Jāhili*s, and a traditional saying of the Prophet telling of the best horse for use in battle. He also quotes the proverb that if they tell you that a red horse fell from a mountain top and was not injured, believe the story (إِذَا قِيلَ الْأَحْمَرُ وَقَعَ مِنْ أَعْلَى الْجَبَلِ وَسَلِمَ، صدق). See Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 249.

¹⁰² For equestrian terms, see Janet C.E. Watson, *Lexicon of Arab horse terminology*, London and New York: Kegan Paul International, 1996.

¹⁰³ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, pp. 237, 243, 249, 303, etc.

¹⁰⁴ See, for example, al-Nāshirī, *Intihāz al-furaṣ*, pp. 21-48, 70-79, 115-147, 184-202, etc; Ibn Mankalī, *Kitāb Uns al-malā*, pp. 55-67, 84; Kushājīm, *al-Maṣā'id wa-al-maṭāriḍ*, pp. 14-46, 58-78, 206-208, etc.

anecdotes on the subject; Chapter 8, verses of poetry describing the hunt. And finally he adds two sections to the last chapter, one discussing diseases of hunting birds, and the other describing miracles connected with hunting that were performed by companions of the Prophet or happened to them and to other people.¹⁰⁵

2. *Hippiatry and the Treatment of Falcons and Hawks in the Umayyad and Abbasid Periods*

Most scholars of Islam describe the ninth and tenth centuries as the “golden age” of Baghdad by virtue of the translation project mentioned earlier in this chapter.¹⁰⁶ During this period many prominent authors wrote about animals, and in particular about horses and *furūsīyah*.¹⁰⁷ The Mamluk veterinary treatise by al-Nāshirī (late 15th- early 16th century) lists in his introduction a number of Arabic treatises on hunting that helped him in writing the book. He even states with pride that he possesses a copy of one of those important treatises. The books he lists all belong to the Islamic tradition, many of them from the realm of theology. The books mentioned are: 1. *Kitāb al-Jawāriḥ wa-al-ṣayd* by the Abbasid poet ‘Abd Allāh Ibn al-Mu‘tazz (d. 296 H). 2. A book on hunting by Maḥmūd al-Warrāq al-Ḥanafī. 3. Kushājīm’s book *al-Maṣa’id wa-al-maṭārid fī al-ṣayd*, which he says is mentioned by Ibn Khallikān in his chronicle and this is the famous book of which he possesses a copy. 4. A book by the Cadi al-Qāsim b. ‘Alī al-Ḥusayn al-Zaynabī (d. 563), known as *Fī Aḥkām al-ṣayd*. 5. two books, one titled *al-Buzāt wa’l-ṣayd* (Hawks and hunting), and the second *al-Salām wa-al-nuzḥah wa-siyasat al-mulūk* (Peace, pleasure and the policy of kingdoms) by al-Amīn al-Qāsim b. Mūsā Abū al-Duluf al-‘Ijlī (d. 226). 6. In the last list of sources he counts books by editors of Hadith collections and religious literature like that of the Imām Muḥammad b. Ismā‘il al-Bukhārī, as well as writers of books of *Fatwās* belonging to the Shāfi‘i School.¹⁰⁸ Some

¹⁰⁵ Al-Nāshirī, *Intihāz al-furaṣ*.

¹⁰⁶ Cahen, *l’Islam*, pp. 93-96.

¹⁰⁷ The scientific edition of the veterinary book by al-Malik al-Mujāhid, edited by Yaḥyā Wahīb al-Jabbūrī includes over 50 treatises on treatment of horses and on *furūsīyah* that were written before the Mamluk period. Among the writers are Āmr b. Karkara, Khalaf al-Aḥmar, Muḥammad b. al-Ḥasan, Ibn al-Kalbī, Abū ‘Ubaydah, al-Aṣma‘ī, al-Kurunbā‘ī, al-Madā‘inī, Ibn al-‘Arabī, al-Shībānī, al-Jumaḥī, al-Khutlī, al-Kindī, al-Jāḥiz, Ibn Qutaybah, Ibn Abī al-Dunyā, al-Zajāj, Ibn Durayd, al-Washshā’, al-Qālī, al-Ma‘arrī, al-Baghdādī, al-Daḡiqī, etc. For a full list of the authors, see al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, pp. 17-25.

¹⁰⁸ See al-Nāshirī, *Intihāz al-furaṣ*, pp. 13-19.

of the pre-Mamluk treatises on animals focused on philological or zoological aspects, for example, the works of al-Jāhiz, al-Kalbī, Ibn Hishām, al-Asma'ī, Abū 'Ubayda, Ibn al-Muthannā, Ibn al-A'rābī, Muḥammad b. Ḥabīb, and dozens of others.¹⁰⁹

The move to the new capital, Damascus, and the transfer of the administrative centre to Syria had considerable impact on the culture of regions that had been under the Byzantine cultural influence for the centuries that preceded Islam. Evidence indicating the existence of the veterinary profession in the Umayyad period appears in an anecdote involving Caliph Hishām b. 'Abd al-Malik (reigned 723-743). According to this story, one day Caliph Hishām attended a ceremonial procession of the cavalry that included the equestrian arts. As he approached one of the riders, the horse panicked and recoiled, and even began rearing until its rider lost control. The Caliph reproved the horseman and said to him: "How are you supposed to fight on such a horse and control it during battle if you cannot control it during a procession?" The man explained that this was not the horse's usual behaviour, and that it had panicked at the caliph's approach because he looked like a veterinarian named Ghazawān who had treated it in the past; he had a striking resemblance to the caliph and even squinted like

¹⁰⁹ Aḥmad, *al-Islām wa-al-ṭibb al-bayṭarī*, pp. 14-15. In his bibliographic book, al-Nadīm lists dozens of essays of a philological nature, most of them devoted to descriptions of horses' characteristics. This stemmed from interest in the *Jāhili* heritage; writers from the early Islamic period to the Abbasid period found in it a wealth of material for their compilations. The list includes many treatises that have been lost and there is only indirect knowledge of their existence. Below is the list of authors from al-Nadīm's *Fihrist*: Abū Mālik 'Amr b. Karkarah, *Kitāb al-Khayl (al-Fihrist)*, p. 49; Abī Miḥḥim al-Shaybānī, *Kitāb al-Khayl* (p. 52); Abū Tharwān al-'Uklī, *Kitāb Khalq al-faras* (p. 52); Khalaf al-Aḥmar, *Kitāb al-Khayl* (p. 56); Naḍr b. Shumayl, *Kitāb Khalq al-faras* (p. 58); Quṭrub, *Kitāb Khalq al-faras* (p. 58); al-Asma'ī, *Kitāb Khalq al-faras wa-kitāb al-khayl* (p. 61); Abū 'Ubaydah, *Kitāb Asmā' al-khayl wa-kitāb ḥaḍir al-khayl wa-kitāb al-khayl* (p. 59); Aḥmad b. Ḥātim, *Kitāb al-Khayl* (p. 61); *Kitāb al-Khayl wa-sabqihā wa-asnānihā wa-shayyātiḥā wa-ghurraṭihā wa-iḍmāriḥā waman nusiba ilā farasihi* (p. 63); al-Riyāshī, *Kitāb al-Khayl* (p. 64); al-Zajjāj, *Kitāb Khalq al-faras* (p. 66); Ibn Durayd, *Kitāb al-Khayl al-ṣaghīr wa-kitāb al-khayl al-kabīr* (p. 67); Abū 'Amr al-Shaybānī, *Kitāb al-Khayl* (p. 75); Ibn al-A'rābī, *Kitāb al-khayl wa-nasab al-khayl* (p. 76); Thābit b. Abī Thābit, *Kitāb Khalq al-faras* (p. 76); al-Karmānī al-Anṣārī, *Kitāb Khalq al-khayl* (p. 77); Abī Muḥammad Qāsim al-Anbārī, *Kitāb Khalq al-faras* (p. 81); Ibn Qutaybah, *Kitāb al-Khayl* (p. 86); Ibn Sa'dān, *Kitāb al-Khayl* (p. 87); *Kitāb al-Khayl al-sawābiq* (p. 88); al-Washshā', *Kitāb al-Faras* (p. 93); Hishām b. Muḥammad b. al-Sa'ib al-Kalbī, *Kitāb al-Khayl wa-kitāb khayl al-'arab* (p. 109); al-Madā'inī, *Kitāb al-Khayl wa-al-riḥān wa-kitāb al-khayl* (p. 117); Muḥammad b. Salām, *Kitāb al-Hilāb wa-ijrā' al-khayl* (p. 126); Ashnā'ī, *Kitāb al-Khayl* (p. 127); al-'Utābī, *Kitāb al-Khayl* (p. 135); Ibn Abī Ṭāhir, *Kitāb al-Khayl al-kabīr* (p. 163); Muḥammad b. al-Ḥasan, *Kitāb al-Khayl* (p. 257).

him.¹¹⁰ Apart from this mention of the veterinarian Ghazawān, a Christian who worked in the town of Homs (ar. Ḥimṣ), the anecdote also emphasizes the behaviour of the horse and its ability to distinguish between people.¹¹¹

The sources often describe Caliph Hishām as the first Umayyad caliph who engaged in hunting and even appointed an official to be responsible for the hunting animals in his court, granting him the title, *Ṣāhib al-ḍawārī*. The man who filled this post is mentioned in veterinary sources as al-Ghaṭrīf b. Qudāma al-Ghassānī, who, according to scholars of Islamic veterinarianism, was one of the first to write a book on the subject.¹¹² His skills in treating animals have been much discussed in late veterinarian literature. Al-Ghaṭrīf, who continued in this role during the reign of Hishām's successor, al-Walid b. Yazīd (743-744), apparently lived until the beginning of the Abbasid period during the reign of Hārūn al-Rashīd (786-809). His veterinary treatise is extant in different versions in a number of manuscripts scattered around various libraries and its main contents are related to the treatment of various hunting birds (in other words, falconry and hawking book).¹¹³ A late veterinary treatise, entitled *al-Qānūn fī al-bayzarah* mentions al-Ghaṭrīf's name together with Adham b. Miḥriz, remarking that al-Ghaṭrīf was highly knowledgeable in the field and describing him as the man who was responsible for the health of the ruler's hunting birds (*ustādh*). An examination of the manuscript shows that the anonymous author of *al-Qānūn fī al-bayzarah* drew much of his material from al-Ghaṭrīf.¹¹⁴

¹¹⁰ 'Abd al-Ḥayy b. Aḥmad Ibn al-'Imād, *Shadharāt al-dhahab fī akhbār man dhahab*, Beirut: al-Maktab al-Tijārī, 1966, vol. I, p. 164.

¹¹¹ *Ibid.*

¹¹² Möller, *Studien*, p. 34.

¹¹³ For a list of these manuscripts, see Möller, *Studien*, pp. 26-29. For a Facsimile Edition of Topkapı Sarayı manuscript of this work, see Fuat Sezgin (ed.), *The Book on birds of prey—Kitāb ḍawārī al-ṭayr by al-Ghaṭrīf ibn Qudāma al-Ghassānī (eighth century AD)*, Frankfurt am Main: Institute for the History of Arabic-Islamic Science at the Johann Wolfgang Goethe University, 1986. Another manuscript is housed in Dār al-Kutub, Cairo, No. 748 [*Tibb*]. For Western translations of al-Ghaṭrīf, see Håkan Tjerneld, *Moamin et Ghatrif: Traités de fauconnerie et des chiens de chasse*. Édition princeps de la version Franco-Italienne, Stockholm: Edition C.E. Fritze and Paris: Librairie J. Thiébaud, 1945. See also Ibn Qudama al-Gitrif al-Ghassani, *Traité des oiseaux de vol (VIIIe siècle), Le plus ancien traité de fauconnerie arabe*, traduit, introduit et annoté par François Viré et Detlef Möller. Texte préparé pour l'édition par Baudouin Van den Abeele. Bibliotheca Cynegetica, 3, Nogent-le-Roi: J. Laget, 2002; Stefan Georges, *Das Zweite Falkenbuch Kaiser Friedrichs II. Quellen, Entstehung, Überlieferung und Rezeption des Moamin*, Berlin: Akademie Verlag, 2008.

¹¹⁴ Dār al-Kutub, Cairo, Ms. No. 748 [*Tibb*], fols. 1-2.

Apart from al-Ghaṭrīf, there is little evidence that other writers of the Umayyad period were familiar with this subject. Those who possessed some knowledge on falconry were mainly scholars whose knowledge in this field was purely theoretical, and some who saw the study of veterinary material as part of a broad general education. Most of these scholars were engaged in theological studies and some of them bore the role of *cadi*. One whose name is mentioned frequently is Abū Wāthilah Iyās b. Mu'āwiyah al-Muznī, a *cadi* who was considered an eminent and wise *faqīh*, among other things because of his sharp senses for nature and animals. One anecdote relates that on seeing a certain stone in a building in the town of Wāsiṭ in Iraq, he declared that there was a live animal underneath it. One of those present lifted the stone and there was a live snake. Abū Wāthilah explained that he had discerned it by the accumulation of moisture at the edges of the stone, which indicated the presence of a living creature underneath.¹¹⁵ This scholar is often quoted in the *Adab* sources in the context of animals' behaviour.¹¹⁶ Such an observation does not show any expertise in veterinary medicine, but the importance attributed to knowledge on animals based on observation and experience is worthy of notice.

Abū Wāthilah Iyās b. Mu'āwiyah, who is mentioned frequently by al-Jāḥiẓ in his book *Kitāb al-Ḥayawān*, was one of a group of scholars who probably formed a link in the chain of development of veterinary science. He does not seem to have dealt with practical treatment, but some of the theoretical materials on animals were later integrated into professional veterinary writings. However, most of these zoological treatises were not really incorporated into the veterinary literature, because subjects that did not appear in the veterinary sources and were broadly used in zoological literature connected with the breeding of types of animals such as fish, reptiles and bees did not interest the writers of veterinary literature.

¹¹⁵ Al-Jāḥiẓ, *Kitāb al-Ḥayawān*, vol. VI, p. 568. This story cited from Iyās b. Mu'āwiyah appears frequently in al-Jāḥiẓ. See also al-Jāḥiẓ, *Kitāb al-Ḥayawān*, vol. II, p. 297, vol. V, p. 314, vol. VI, pp. 395-396, etc.; al-Damīrī also cites al-Jāḥiẓ who, in turn, cites Iyās. See al-Damīrī, *Ḥayāt al-Ḥayawān*, vol. I, p. 608.

¹¹⁶ He is quoted as stating some "facts" related to the behaviour of roosters. One, for example, refers to the behaviour of a rooster who does not scatter grains of food in all directions as roosters usually do, but gathers them eagerly. He explains that this is an old rooster, because young cockerels scatter the grains in the direction of the hens in order to entice them, while an old rooster loses his desire for females and begins to think only of himself. Whether or not this explanation sounds logical, its importance lies in the originality and novelty of determining facts on animals based on observation and experience rather than on citing early sources. See al-Jāḥiẓ, *Kitāb al-Ḥayawān*, vol. II, p. 297.

Al-Jāḥiẓ (159/775-255-868) gives several examples of what he claims to be inaccuracies on the part of Iyās b. Mu'āwiyah. On the subject of cross-breeding of different types of fish and the development of new types,¹¹⁷ he does not agree with those who accept Iyās's claim that a type of fish called *al-shabūṭ* (*Barbus grypus*) was produced by cross-breeding two types of fish. He rejects the idea that this is similar to the cross-breeding of a donkey and a horse, which produced the mule. Al-Jāḥiẓ dismisses the argument of those who say that eggs have never been found in the stomach of a Shibuta (*al-shabūṭ*) fish, stating that he examined the matter himself and found eggs in their stomachs. He adds that this fact is not invariable and that he did not find eggs in this type of fish. Al-Jāḥiẓ's remarks on this issue are important because he was considered the greatest zoology writer in Arabic. These remarks reveal a 'new' mode of learning, based on physical examination of animals rather than copying material from earlier sources or theoretical study of facts. Al-Jāḥiẓ says explicitly that one cannot rely solely on books from the past because there may be errors in their translation, and he mentions especially Aristotle's famous writings on animals, in which he claims to have found inaccuracies and mistakes.¹¹⁸ Many studies note that al-Jāḥiẓ based the contents of his books on Aristotle's zoological works, and it is clear that much of his material is based on the classical heritage that was passed down to the Arabs through the translation project. However, we should not underestimate al-Jāḥiẓ, whose work contains a great deal of original material based on his personal experience and his power of discernment.¹¹⁹

¹¹⁷ Al-Jāḥiẓ, *Kitāb al-Ḥayawān*, vol. I, pp. 92-93. {إنّ زعمهم أن الشبوط ولد الزجر من البني، وإنّ {الشبوط لا يخلق من الشبوط، وأنه كالبعل في تركيبه وأنسأله ورووا ذلك عن إياس بن معاوية بن قرة

¹¹⁸ Al-Nadīm, in his *Fihrist*, notes that Aristotle's *Kitāb al-Ḥayawān li-Aristūṭālīs* was translated into Arabic from Syrian by Ibn Zar'ah, who was a contemporary of al-Nadīm (10th century). Ibn Zar'ah also translated another book, titled *Kitāb Manāfi' a'dā' al-ḥayawān*. See al-Nadīm, *al-Fihrist*, p. 323; Aristāṭālīs, *Fī a'dā' al-ḥayawān*, *al-Maqālāt 11-14*, min *Kitāb al-Ḥayawān*—*al-Tarjamah al-Qadimah min al-Yūnānīyah ilā al-'Arabīyah*, ed. Ramkeh Kroke, Amsterdam: Majma' al-'Ulūm al-Malakī, 1978.

¹¹⁹ The editors who published the Arabic translation of Aristotle's *De Generatione Animalium* describe the vast influence of this book on the writers of Arabic zoological and *Adab* literature. Among these, they mention al-Jāḥiẓ, who referred to Ibn al-Baṭriq as one of the translators of Aristotle's book into Arabic. Al-Jāḥiẓ relates mainly to the actual work of translation and the difficulties faced by the translator. The editors add that al-Jāḥiẓ was more interested in details of the animals themselves than in the theoretical aspects that were generally included in literary works. According to the editors, al-Jāḥiẓ set the standard for Arab zoology, particularly in the eastern Islamic world. They also mention writers of zoological literature such as Ibn Qutaybah (889), al-Mas'ūdi (956), Abū Ḥayyān al-Tawḥīdī (1023), and Ibn Sīnā (1037). From the Mamluk period they mention al-Qazwīnī (1283), al-Nuwayrī (1332) and al-Damīrī (1405). According to the editors, Maimonides, in a book he

Alongside works defined as general books on animals, like that of al-Jāhiz, we can find material on zoological knowledge and treatment of animals in anthologies of *Adab* and of lexical essays from the Abbasid period, such as those of al-Aṣmaʿī, al-Kalbī, Ibn ʿUbaydah, and many others. Both genres include information on animals. The treatises dealing with veterinary subjects in these works were mainly theoretical and may be ascribed to the realm of zoology, such as classification of animals according to their zoological characteristics, including a description of their mating periods, life span, types of food appropriate for them, the use of various organs for curing human diseases, their behaviour, and so forth. Professional medical material was almost entirely absent from these books. They related to animals in general without focusing on specific types such as domesticated animals or beasts of burden, unlike the later professional veterinary treatises, which dealt with a limited range of types of animals, mainly those that were in general use in Mamluk society, whether for hunting (falcons and hawks) or for battle (horses).

Möller, in his comprehensive study on the origins of Arab falconry, states that despite the enthusiasm for falconry in the Abbasid court there was no real incentive to expand the professional literature on it.¹²⁰ He mentions quotations that appear in a manuscript by Ibn Qushtumur (dated 667/1267) from a falconry book attributed to Abū al-Qāsim b. Ikhshīd, written in the year which he became ruler of Egypt (334/964). Möller writes that judging from the citations Abū al-Qāsim's treatise seems to have been a book of critical nature that cannot be identified with the one by *al-Wāthiqī*, which was written a hundred years earlier. Al-Nadīm's bibliographical book, "*Fihrist*" (987 CE), mentions a book of indeterminate date by Muḥammad b. ʿAbd Allāh b. ʿUmar al-Bāzyār, with the title of *al-Jawāriḥ*.¹²¹ The historian and geographer al-Masʿūdī (d. 346/957), in his book *Murūj al-dhahab*, writes on falcons in a way that matches exactly al-Ḥajjāj's version of Adham/al-Ghaṭrīf.¹²²

wrote on animals (مقالة تشتمل على فصول من كتاب الحيوان) based his approach more on empirical observation than on Aristotle's theoretical material, thus following the example set by al-Jāhiz, who had immense influence on all subsequent Arabic literature. See Aristūṭālīs, *Fī kawṇ al-ḥayawān: al-maqālāt 15-19 min kitāb al-ḥayawān (tarjamah min al-yūnānīyah nusibat ilā Yahyā b. al-Baṭrīq)* [*Generation of animals*], eds. J. Brugman and H.J. Drossaart Lulofs, Leiden: E.J. Brill, 1971, pp. 41-52; see also al-Nadīm, *al-Fihrist*, pp. 208-212; Herbert Eisenstein, *Einführung in die Arabische Zoographie: Das tierkundliche Wissen in der arabisch-islamischen Literatur*, Berlin: Dietrich Reimer Verlag, 1990, pp. 121, 142, 150, 154, 189.

¹²⁰ Möller, *Studien*, pp. 111-114.

¹²¹ Al-Nadīm, *al-Fihrist*, p. 377.

¹²² Al-Masʿūdī, *Murūj al-dhahab*, vol. I, pp. 186, 301.

According to Möller, the most important hunting book of the first half of the tenth century is that of Abū al-Faṭḥ Maḥmūd b. al-Ḥusayn al-Sindī, known as Kushājīm (d. after 358/968). In this book, *Kitāb al-Maṣā'id wa-al-Maṭārid*, he artistically combines professional knowledge on falconry (according to Möller he used al-Ḥajjāj's version) with material collected by Arab philologists of the Abbasid period who wrote on hunting.¹²³ Kushājīm was the first to deal in a hunting book with the question of religious decrees on the purity of hunting and killing wild animals which the Muslim has to take into consideration during the hunt.¹²⁴ Kushājīm's book is distinguished by its poems on hunting, *Tardīyāt*, a genre already used by the ninth-century poet Abū al-Nuwās and other poets after him. From the tenth century we find a reference to Ibn al-Mu'tazz (908), known as 'the caliph of one day', as the author of a falconry book which does not appear to be extant today.¹²⁵

Towards the end of the tenth century a falconer named Abū 'Abd Allāh al-Ḥasan b. al-Ḥusayn, wrote a book for the Fāṭimid caliph in Cairo, al-'Azīz billāh (ruled 976-992). According to Möller, this book is largely a copy of Kushājīm's work and of the book *Kitāb al-Jawāriḥ*. Möller also states that the personal contribution of this falconer-author to the book was minimal, but nevertheless one can learn from it the falconry customs in the Egyptian Fāṭimid court.¹²⁶

Möller asserts that from the mid-tenth century to the mid-twelfth century the only known book on falconry is that of al-Qāsim b. 'Alī b. al-Ḥusayn al-Zaynabī, written in 555/1160 for the Abbasid caliph, al-Mustanjid billāh (reigned 555-565/1160-1170). The existence of this book, which bore the title

¹²³ Abū al-Faṭḥ Maḥmūd Ibn al-Ḥasan al-Kātib al-Ma'rūf bi-Kushājīm (d. after 358 H/968), *al-Maṣā'id wa-al-maṭārid*, ed. Muḥammad As'ad Ṭalas, Baghdad: Dār al-Ma'rifah, 1954. A manuscript of the book is housed in Istanbul: Süleymaniye Kütüphanesi, Istanbul, Ms. Fatih 4090.

¹²⁴ Kushājīm, *al-Maṣā'id wa-al-maṭārid*, pp. 14-39.

¹²⁵ According to the chronicler Abū al-Fidā', 'Abd Allāh b. al-Mu'tazz was born in Sāmārā' in 247/861 and was killed in Baghdad in 296/908 after one day on the caliph's throne. See Abū al-Fidā', *al-Mukhtaṣar*, vol. II, p. 91. On his literary work, especially his drinking poetry, see, for example, Abū al-'Abbās 'Abd Allāh b. al-Mu'tazz, *Fuṣūl al-tamāthīl fī tabāshūr al-surūr*, ed. Jūrj Qanāzī' and Fahd Abū Khaḍrah, Damascus: Maṭbū'āt Majma' al-Lughah al-'Arabīyah, 1410/1989.

¹²⁶ The published version, edited by Maḥmūd Kurd 'Alī, met with negative criticism from some scholars, among them Möller, who faulted the editor for publishing an incomplete manuscript. Abū 'Abd Allāh al-Ḥasan b. al-Ḥusayn (?), Bāzyār al-'Azīz bi-Allāh al-Fāṭimī, *al-Bayzarah*, ed. Maḥmūd Kurd 'Alī, Damascus: Maṭbū'āt Majma' al-Lughah al-'Arabīyah, 1409/1988.

al-Qawānīn al-Sultānīyah, is known to us from the many quotations from it that appear in Ibn Qushtumur's book.¹²⁷

Usāmah Ibn Munqidh's book, *Kitāb al-I'tibār*, is another twelfth century Arabic treatise mentioned by Möller in the context of hunting and falconry. Although the book is famous as an interesting autobiographical book that illuminates the period in a special light, it also includes a great deal of material related to hunting. Usāmah's descriptions of hunting expeditions in which he participated as a youth when he accompanied his father cast light on the subject of hunting, the people who engaged in it, and the animals that were used for the hunt.¹²⁸

The major falconry and hunting books that were written in the thirteenth century reveal a perceptible endeavor on the part of the authors who were active in Baghdad to encompass all the professional knowledge from previous centuries. One methodically primitive (as defined by Möller) compilation of early Arabic literature, *Kitāb al-Ṣayd* (The hunting book), was executed at the instruction of Caliph al-Mustanṣir billāh (623-640/1226-1242). It mainly deals with falconry.¹²⁹ During the same period ʿĪsā b. ʿAlī b. Ḥasan al-Asadī wrote *al-Jamharah fī al-Bayzarah*, the most comprehensive hunting book known to date. The author spent 23 years traveling from country to country in order to study the subject and gather a huge amount of material on hunting, especially falconry. Although his editing of the book leaves something to be desired, every detail is presented clearly. In particular, the text is suitable for the study of technical falconry terms, because the author lays great stress on the use of correct professional terms and points out mistakes in this respect.¹³⁰ Möller states that the influence of these encyclopedists brought Arabic falconry literature to the peak of its creativity.¹³¹ This statement is somewhat exaggerated, as will be shown later in this book.

¹²⁷ See Ibn Qushtumur (بغدي بن علي بن قشتمر، كتاب القانون الواضح في معالجة الجوارح) Köprülü Kütiphanesi, Istanbul, Ms. 978, fol. 2r^o.

¹²⁸ Ibn Munqidh, *Kitāb al-I'tibār*, pp. 191-226.

¹²⁹ Möller, *Studien*, pp. 77-79, 114.

¹³⁰ See Istanbul, *Ayasofya*, Ms. 3814 (672/1273); Escorial, Madrid, Derenbourg, *Les manuscrits arabes* (1884-1903): Ms. 903 (997/1589). Parts of the Escorial manuscript were published in an English translation by Phillott and Azoo. See D.C. Phillott and R.F. Azoo, "On Hunting Dogs, pp. 599-600; eadem, "Some Birds and other Animals that Have Been Metamorphosed, pp. 139-143; eadem, "The Birds' Complaint before Solomon, pp. 173-178; eadem, "Things which the Owners of Hawks Should Avoid, pp. 401-403. See also Möller, *Studien*, pp. 79-87, 114.

¹³¹ Möller, *Studien*, p 114.

According to Möller no information exists on Arabic falconry books written in Spain prior to the fourteenth century, although there are poems about falcons. For example, *Kitāb al-Ṭayr*, a book written in verse on hunting falcons by Hārūn al-Ramadī al-Andalusī (d. 403/1012) is extant. The absence of falconry books in Andalusian Spain is surprising in light of the fact that the Umayyad caliphs who moved to Spain zealously continued their hunting and falconry as in Damascus.¹³²

Among all the veterinary works on horses written during the Abbasid period, Ibn Akhī Ḥizām's book stands out. This book is known by several names, such as *Kitāb al-Bayṭarah*, *Kitāb al-Furūsīyah wa-al-bayṭarah*, or *Kitāb al-Khaṣl wa-al-bayṭarah*.¹³³ The author is regarded by several scholars as one of the most important figures in Arab veterinary literature, and they even compare the value of this work on veterinary medicine to that of Galen's medical book.¹³⁴ This work is apparently the only professional hippiatric treatise surviving from that period; hence it became a source from which later authors of veterinary books drew material.¹³⁵ Sometimes we even find entire passages from this book copied word for word in the works of writers from the Mamluk period. Al-Ṣāḥib Tāj al-Dīn (640-707/1242-1307), for example, in the introduction to his book, declares that his personal knowledge and experience, as well as his accumulated practise of *furūsīyah*, form the basis for his comprehensive veterinary work, and above all, he links the veterinary sphere with Jihad. The search for this author's sources leads directly to the book by Ibn Akhī Ḥizām, about whom very little is known except for the fact that he was responsible for the stables of the Abbasid caliph, al-Mu'taḍid (Ninth century CE). These lines of al-Ṣāḥib

¹³² *Ibid*, p. 113. As already noted, a translation of an early Arabic work on falconry into Castilian has been carried out in the 1250s in the court of King Alfonso X, "The Wise," and is preserved in Spain in two manuscripts, one of the thirteenth and one of the fourteenth century. See Muḥammad ibn 'Abd Allāh ibn 'Umar al-Bāzyār, *Libro de los Animales*.

¹³³ See, for example, the manuscripts preserved in the Dār al-Kutub Library in Cairo: محمد بن يعقوب بن أخي حزام، فنون في علم الفروسية، طب 1609، ميكرو فيلم 31432، ابن أخي حزام، كتاب الطب والبيطرة، طب 1200، ميكرو فيلم 31249، ابن أخي حزام، كتاب الفروسية والبيطرة في علامات الخيل، طب 1610، ابو يوسف يعقوب بن أخي حزام رابض: "ميكرو فيلم 32175" See also the manuscript in London: "المعتضد، كتاب الفروسية وشيأت الخيل" B.L., *Ms. ADD*, 23,416.

¹³⁴ Ullmann, *Die Medizin im Islam*, pp. 219-220. This comparison of Ibn Akhī Ḥizām's veterinary book with Galen's book on human medicine also appears in some other veterinary treatises, which state explicitly: "This book on veterinarianism of beasts parallels Galen's masterpiece on human medicine" (هو في بيطرة البهائم يوازي كتاب الصناعة الكبيرة لجالينوس في طب) See, for example: B.L., *Ms. ADD*, 23,416, fol. 3r°; Bodleian Library, Oxford, *Ms. Pococke* 129, fol. 5v°; Bodleian Library, Oxford, *Ms. Arab. d. 208*, fol. 5v°.

¹³⁵ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 11 (Introduction of the ed. al-Duqāq).

Tāj al-Dīn appear identically in a still extant of Ibn Akhī Ḥizām's veterinary treatise, which is considered to be the earliest written in Arabic.¹³⁶ In fact, al-Ṣāhib Tāj al-Dīn, who wrote during the Mamluk period, also follows Ibn Akhī Ḥizām's manner of mentioning his sources. It may be assumed that al-Ṣāhib Tāj al-Dīn's project, like that of Ibn al-ʿAwwām, consisted mainly of collecting material and organizing it. This is particularly salient in the second part of his book, which includes medical information, mainly descriptions of diseases of horses and suggestions for treating them. Indeed, the author declares in his introduction to the second part that his aim in writing the book was to collect all the material he could from the words of ancient sages and philosophers, whom he calls 'the people of *al-Rūm*' (i. e. Greeks, Romans or Byzantines). He also mentions some channels for gathering veterinary information from other cultures, such as the Persian, Indian and Arabic cultures. Thus, he did not restrict his choices to one particular culture or tradition, but rather included a broad range of information, as he puts it, 'from distant regions', who engaged in horse medicine, at least those that had been translated into Arabic from different languages.¹³⁷ In the second part of his book he states repeatedly that it consisted largely of collecting and copying material verbatim, and therefore he asks the readers not to blame him for any contradictions or inaccuracies.¹³⁸

Abū Bakr al-Bayṭār (d. 741/1340), too, uses Ibn Akhī Ḥizām as his major source, and even goes as far as to say that there is no book on earth like that of Ibn Akhī Ḥizām.¹³⁹ He does not explicitly mention Ibn Akhī Ḥizām as his source in every case, but an examination of the contents indicates that in many instances the source is almost certainly Ibn Akhī Ḥizām. Here

¹³⁶ Below is the passage from al-Ṣāhib Tāj al-Dīn's introduction that may be compared to Ibn Akhī Ḥizām's introduction as it appears in the London manuscript (see also the following footnote). (أما بعد، فإني لم أزل بعد ما وهب الله لي من المعرفة بالآلات الفروسية وما وهب لي من) لطيف النظر شديد الفحص عن ما وصفه أهل النجدة والبأس من ذوي النبات الحمية في مجاهدة أعداء الله ومحاربة من عاند الحق ومرق عن الدين وصدف عن آيات ربه حتى يسر لي الامتحان والتجربة ما وصفته في كتابي هذا مما يحتاج إليه أهل الجهاد في سبيل الله بالإخلاص والصدق من فنون علم الفروسية والرجلة والمعرفة بالذواب (وأحوالها والعلم بالأسلحة وكيف يتبدي من أراد أن يعلم الفروسية وما يحتاج إليه الفارس من الله وبالله التوفيق). Al-Ṣāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, pp. 22-23.

أما بعد، فإني لم أزل بعد ما وهب الله لي من المعرفة بالآلات الفروسية ودقة النظر وشدة الفحص عن ما وصفه أهل النجدة والبأس من ذوي النيات الخالصة لجهاد أعداء الله تعالى ومعاونة من مجد الحق ومرق عن الدين وصد عن سنن الشريعة ومحاربة من ابتدع في الإسلام وتلم الشريعة . . . فيسر الله لي الامتحان والتجربة فصنفت وصدي عن سنن الشريعة ومحاربة من ابتدع في الإسلام وتلم الشريعة . . . (كتابي هذا عوناً لحاجة أهل النجدة والجهاد والتجارة

¹³⁷ Al-Ṣāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. II, p. 2.

¹³⁸ *Ibid.*, pp. 2-3.

¹³⁹ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, pp. 53, 111, 289, 317, etc.

are a few examples: one, the treatment suggested for urinary retention is based on Ibn Akhī Ḥizām's recommendation to use asparagus seeds (*halayūn* in Arabic).¹⁴⁰ Two, in discussing the illness known as cows' disease (*dā' al-baqar*), Abū Bakr explains that early veterinary books described this disease as incurable, saying that no animal could survive after being affected by it.¹⁴¹ Three, on the matter of pain originating from the heart, Abū Bakr also quotes from Ibn Akhī Ḥizām's book.¹⁴² Although, there are some slight differences in the prescriptions or the substances used in preparing medicines, it may be assumed that these differences stem from the use of different manuscripts of the same source.

H. BETWEEN AGRICULTURE AND VETERINARY MEDICINE— IBN AL-‘AWWĀM'S TREATISE

Ibn al-‘Awwām's large book on agriculture, *Kitāb al-Filāḥah*, is regarded as one of the most comprehensive books on the subject (35 chapters).¹⁴³ In addition to the main topics that he deals with (agricultural crops, botany, soil amelioration), this twelfth century author from Seville includes some chapters of a veterinary nature, and thus turns the book into perhaps the most important work of the period on animal medicine.

The last five chapters (31-35) are devoted to various issues connected with animals. In point of fact, only four of these appear in the book that was published in Madrid in 1802, accompanied by a Spanish translation. The last chapter, devoted to dogs, is missing, and its contents are known to us only from Ibn al-‘Awwām's introduction, where the author refers to the signs to look for in choosing a dog, methods of training dogs and treating their illnesses, and some recommendations to ensure their wellbeing.¹⁴⁴ In these four chapters Ibn al-‘Awwām in fact summarizes the Muslim

¹⁴⁰ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 325; Ibn al-‘Awwām, *Kitāb al-Filāḥah*, vol. II, p. 612.

¹⁴¹ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 311; Ibn al-‘Awwām, *Kitāb al-Filāḥah*, vol. II, p. 621.

¹⁴² Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 91; Ibn al-‘Awwām, *Kitāb al-Filāḥah*, vol. II, p. 604.

¹⁴³ The biographical literature features several versions of the death date of Abū Zakariyyā Yahyā b. Muḥammad b. Aḥmad Ibn al-‘Awwām al-Ishbīlī. For example, al-Baghdādī, in his book *al-Īdāḥ*, dates his death to 545/1150, while Kaḥḥālāh (*Mu'jam al-Mu'allifin*) asserts that he died in 540/1145. al-Ziriklī (*al-A'lām*), on the other hand, gives the year as 580/1185. See al-Ziriklī, *al-A'lām*, Beirut, 1969, vol. IX, p. 208; Kaḥḥālāh, *Mu'jam al-Mu'allifin*, Damascus, 1957-1961, vol. XIII, p. 222; al-Baghdādī, *al-Īdāḥ*, vol. II, p. 320; Muṣṭafā al-Shihābī and Others, "Filāḥah," *E.I.*², vol. II, p. 899.

¹⁴⁴ Ibn al-‘Awwām, *Kitāb al-Filāḥah*, vol. I, p. 35.

veterinary heritage up to his day, prior to the establishment of the Mamluk Empire.

The singularity of this book in the context of the veterinary tradition stems mainly from the author's decision to name most of his sources in the introduction. He uses a method of abbreviation by ascribing a letter of the alphabet to each source and referring to them in the text by this letter, so as to avoid unwieldiness.¹⁴⁵ This method is unique in classical Arabic texts, and it is not clear whether it was his own invention or whether he learnt it from earlier non-Arabic sources. His sources include various works in Arabic, primarily the book by Abū 'Umar Ibn al-Ḥajjāj, known as al-Muqanna', whom Ibn al-'Awwām calls *faqīh*, an appellation that signifies his educational field, which is mainly theological. According to Ibn al-'Awwām, this book was written in 466/1073, and the writer was apparently a Spaniard who drew his material from various agricultural compilations that he obtained, as well as some books in other spheres, such as *Adab*, volumes of poetry, collections of Hadith, and so forth, which were available in the Muslim west.¹⁴⁶ Ibn al-'Awwām counts some thirty sources used by Ibn al-Ḥajjāj in his book, most of them Graeco-Byzantine authors such as Junio Moderato Columella, Varro, Democritus *al-Rūmī*,¹⁴⁷ Casianus,¹⁴⁸ Tharur-Athikos,¹⁴⁹ Sidagos el Seyabenese,¹⁵⁰ and also Muslims, including al-Rāzī, Ishāq Ibn Sulaymān,¹⁵¹ Thābit Ibn Qurrah,¹⁵² Abū Ḥanīfah

¹⁴⁵ *Ibid.*, p. 9.

¹⁴⁶ *Ibid.*, p. 8.

¹⁴⁷ Democrito el Griego, who appears in Ibn al-'awwām's book as Dīmūqrītūs al-Rūmī, was not identified by the Spanish scholar Don Josef Antonio Banqueri (1745-1818) who published the book with a Spanish translation including an explanation of all the names. See Ibn al-'Awwām, *Kitāb al-Filāḥah*, vol. I, p. 8 (notes).

¹⁴⁸ Casiano Baso Scolastico produced an anthology entitled *Geoponicon*. According to the Spanish translator and editor Banqueri, he lived during the period of Emperor Constantinus Porphyrogenitus at the end of the 8th century CE. However, Ullmann is of the opinion that he lived in the 6th century. See M. Ullmann, *Islamic Medicine*, p. 17; Ibn al-'Awwām, *Kitāb al-Filāḥah*, vol. I, p. 8 (notes).

¹⁴⁹ Theodorus Aticus or Theodor or Diodoro Atico is one of the names that appear distorted in Ibn al-'Awwām's book. This name, too, was not identified by the above researcher. See Ibn al-'Awwām, *Kitāb al-Filāḥah*, vol. I, p. 8 (notes).

¹⁵⁰ This appears to be a Persian author, as we can learn from certain expressions or terms that appear in some of his statements. See *ibid.*

¹⁵¹ Ishāq b. Sulaymān al-Isrā'īlī (850-932) was an Egyptian physician and philosopher who worked in the town of Qeirawan, in the Maghreb. Among his important works were the books *al-Ḥamīyāt* (the Defenses) and *al-Ḥudūd wa-al-rusūm*.

¹⁵² Thābit Ibn Qurrah (d. 288/901) was born in Ḥarrān, Iraq. A mathematician, physician and philosopher, he belonged to the Šābi'ah group, who are credited with translating many scientific and medical treatises from Greek and Persian to Arabic. He served the Abbasid caliph, al-Mu'taḍid, became one of his confidants and filled the role of Member of the Royal

al-Dīnawarī,¹⁵³ and more.¹⁵⁴ Ibn al-ʿAwwām states that, in addition to Ibn al-Ḥajjāj's book, he used the book *al-Filāḥa al-Nabaṭīyah*,¹⁵⁵ written by Qūthmāy.¹⁵⁶ This book, which is known as Ibn Waḥshīyah's book, also gives a long list of sources, mentioning Adam, Ṣaḡarīt, Yanbūshād, Akhūnkāh, Māsī, Dūnā, Ṭāmitrī and others.¹⁵⁷ Although most of these figures cannot be identified, the names reveal that they belong to ancient traditions—Aramaic (Chaldean), Persian, Greek, Indian or Byzantine.¹⁵⁸ An examina-

Banquet—'Nadīm'. He translated from Greek to Arabic, mainly mathematics and astronomy treatises such as those of Archimedes and Apollonius. His important book is known as *al-Dhakhīrah fi ʿilm al-ṭibb*—The Treasury of Medical Science. See ʿAbd al-Rāziq, *al-Ḥaḍārah al-Islāmīyah*, p. 15.

¹⁵³ Abū Ḥanīfah al-Dīnawarī was a 3rd century AH (9th CE) scholar of Persian origin. Not much is known about him and his name appears in Ibn al-Nadīm's book, *al-Fihrist* (p. 78), which was copied by Yāqūt al-Ḥamawī. He died between 281-282/894-5, and 290/902-3. The fact that he lived in the town of Dinawar is confirmed by the famous astrologer ʿAbd al-Raḥmān al-Šūfī, saw Abū Ḥanīfah studied in Iraq at the two famous grammar schools of Kufa and of Basra, in a period when many scholars were influenced by al-Jāḥiẓ, and he also followed Abū Ḥayyān al-Tawḥīdī in taking an interest in Hellenist philosophy. But, unlike al-Jāḥiẓ, he was interested in sciences, particularly mathematics. He wrote the *Kitāb al-Baḥth fi ḥisbat al-Hind*, which summarizes the Indian knowledge in arithmetic, and another book on algebra *Kitāb al-Jabr wa-al-muqābalah*. He also wrote the astronomy books *Kitāb al-Qiblah wa-al-zawāl*, and *Kitāb al-Anwāʾ*, based on which al-Šūfī conducted his observations. Al-Dīnawarī's most famous book is *Kitāb al-Nabāt*, basically a lexicographic work, in which he compiled a rich collection of oral and literary traditions on the world of flora. His history book, *al-Akhbār al-ṭiwāl* was written from a Persian viewpoint. See B. Lewin, "al-Dīnawarī, Abū Ḥanīfa Aḥmad b. Dāwūd," *E.I.*², vol. II, p. 300.

¹⁵⁴ Ibn al-ʿAwwām cites these names from Ibn al-Ḥajjāj's book, saying: "I base my work on the book of al-Shaykh al-Faqīh al-Imām Abū ʿUmar Ibn al-Ḥajjāj al-Muqanna", which was written in 466 and was based on quotations and opinions of many of the wisest experts in agriculture and the scholastics." He lists 30 names in this book. See Ibn al-ʿAwwām, *Kitāb al-Filāḥah*, vol. I, p. 8.

¹⁵⁵ Nabatea is the name of the province that included all the areas from the Euphrates to the Red Sea, or Sea of Reeds, as Josephus called it. See *Antiquities of the Jews*, book 1, p. 21 [Hebrew]. On the book *Kitāb al-Filāḥah* and its writer, known as Ibn Waḥshīyah, see T. Fahd, "Ibn Waḥshiyya," *E.I.*², vol. III, p. 963.

¹⁵⁶ Ibn al-ʿAwwām, *Kitāb al-Filāḥah*, vol. I, pp. 8-9.

¹⁵⁷ كُتِبَ الفلاحة النبطية تأليف قوثمائي وهو مبني على أقوال أجلة الحكماء وغيرهم وذكر فيه أسماءهم وعدد منهم (ادم وصغريت وبنوشاد واخوخا وماسي ودونا واطاميري وغيرهم، واختصرت ذكر هذا الكتاب واثبت له علامة ط *Ibid.*

¹⁵⁸ Not much is known about Ibn Waḥshīyah, who is attributed with having written (or translated) the book *al-Filāḥah al-Nabaṭīyah*, and some scholars even question his existence. Abū Ṭālib al-Zayyāt (318/930), who claims that he was his student and even his secretary, testifies that the book was translated from Chaldean to Arabic in 291/903. Other opinions are that it was translated from Syrian, Greek, or Pahlavi Persian. This book includes various agricultural traditions (classical Greek, Persian and Indian) that were apparently summarized in Syria. The names that appear in Ibn al-ʿAwwām, citing Ibn al-Ḥajjāj, indicate their varied origins, which matches the mingling of the traditions that form the basis of the book. See T. Fahd, "Ibn Waḥshiyya," *E.I.*², vol. III, p. 963.

tion of the chapters of Ibn al-ʿAwwām's book that include veterinary material reveals three main sources that he uses widely in addition to Ibn al-Ḥajjāj and Ibn Waḥshīyah. These are Qusṭūs and Cassianus,¹⁵⁹ as well as Aristotle.

In his introduction to chapter 31, Ibn al-ʿAwwām defines it as a chapter on 'animal farming'. This was a new concept, considering the treatment of animals as a branch of agriculture. The chapter deals with various issues relating to farm animals such as cows, sheep and goats, and discusses mainly the identification of healthy and fertile animals. It also includes veterinary material concerning fertility and selective breeding, as well as detailed information on the duration of pregnancy and the mating seasons of each of these animals, their life span and the suitable types of food and drink. There is very little medical information and the chapter barely deals with medical practise. It may be assumed that in this case Ibn al-ʿAwwām followed the Byzantine agricultural books known as *Geoponica*, which contain some veterinary material, especially on farm animals, but deal mainly with the world of plants.¹⁶⁰

¹⁵⁹ Under the entry *Filāḥah* in the Encyclopaedia of Islam, the name Kustus al-Rūmī appears as the author of *al-Filāḥah al-Rūmīyah*, a Greek or Byzantine book on agriculture that came out in Cairo in 1293 AH (1876 CE). It was translated from Greek to Arabic by Sarjīs b. Hilyā al-Rūmī. According to Ḥājī Khalīfah, his full name was Kustus b. Askuraskina. The writer of the encyclopedia entry believes that Kustus was the name of the 8th century Cassianus Bassuus (6th century according to Ullmann), who is known as the author of agricultural anthologies based on Greek and Latin treatises. The identification of Kustus as Cassianus is somewhat problematic, in my opinion, because Ibn al-ʿAwwām refers to both these writers frequently, ascribing totally different material to each of them. He also mentions the title of the book *al-Filāḥah al-rūmīyah* as the source from which he copied many methods of treatment. It cannot be determined from the passages quoted whether the book in question was the one written by Kustus, Cassianus, or some anonymous writer. At the same time, the fact that Ibn al-ʿawām, in quoting medical material, distinguishes between Kustus, Cassianus, and a copy of *al-Filāḥah al-rūmīyah* in his possession raises doubt as to whether it is indeed the same book or the same author. See M. al-Shihabi and Others, "Filāḥah," *E.I.*², vol. II, p. 899; Ḥājī Khalīfah, *Kashf al-ẓunūn*, vol. II, p. 1447.

¹⁶⁰ Smithcors notes that agricultural treatises from the Byzantine period deal with animals other than horses. According to him, this indicates that Byzantine veterinarians did not treat farm animals but only horses that served the Byzantine army. He cites writers of agricultural literature in saying that there is nobody to consult regarding animal illnesses. The few methods of treatment that are described are based mainly on folk medicine and superstition, use of amulets and whispers, and cauterizing. For example, hanging a wolf's tail in the cowshed so that the cows will not suffocate; ensuring that the number of animals in the herd is an even number; various prescriptions to influence the sex of the foetus. Smithcors remarks that this kind of material did not find a place in professional veterinary essays dealing with horses in that period. See Smithcors, *Evolution of the Veterinary Art*, pp. 101-102.

In light of the important place of horses in the development of Greek and Mamluk veterinary medicine, it is worth paying special attention to the sources on which Ibn al-ʿAwwām bases his chapter on horses. He begins with a general statement about Aristotle, taken, he says, from the essay “On the nature of animals.”¹⁶¹ The statement determines that horses who live freely in a pasture or meadow are less susceptible to illness than those who are kept in a stable. He also adds that free horses are not harmed by diseases except for problems affecting the hooves. Following Aristotle, the author describes a method of diagnosing diseases of the hooves by observing trembling or spasms (*ikhtilāj*) of the horse’s right testicle. Another diagnosis is performed by finding an accumulation of dirt in the horse’s left nostril. Ibn al-ʿAwwām also cites other people whom he defines as experienced in the care of horses, presenting the conventional view in veterinary medicine, that diseases of horses are similar to those of humans.¹⁶²

Ibn al-ʿAwwām arranged the medical contents according to the parts of the horse’s body, starting from the head and ending with the legs.¹⁶³ This became the conventional method in the course of time. The sources used by Ibn al-ʿAwwām in this chapter are no different from those presented in earlier chapters. That is to say, he quotes authors of Greek origin such as Cassianus, Qusṭūs, Aristotle, Hippocrates the veterinarian, and also Arab authors, such as Ibn Akhī Ḥizām, Mūsá Abū Naṣr, al-Aṣmaʿī, and Abū ʿUbaydah. But, undeniably, Ibn Akhī Ḥizām’s book takes pride of place in everything connected with medication and medical treatment.

¹⁶¹ It should be noted that this title of Aristotle’s essay does not match any of his extant zoological books. These books, called in Latin *Libri de animalibus*, generally comprised five parts: 1. *De historia animalium* (10 volumes); 2. *De progressu animalium* (1 volume); 3. *De motu animalium* (1 volume); 4. *De partibus animalium* (4 volumes); 5. *De generatione animalium* (5 volumes). Aristotle’s works were translated into Arabic in the school of Ḥunayn Ibn Ishāq. The two translation classical Arabic books that have survived and been published are 1. Aristūṭālis, *Fī Aʿdāʾ al-ḥayawān*; 2. Aristūṭālis, *Fī Kawn al-ḥayawān* (see also notes 118 and 119 in this chapter).

¹⁶² Ibn al-ʿAwwām, *Kitāb al-Filāḥah*, vol. II, pp. 568-569.

¹⁶³ *Ibid.*, p. 568.

CHAPTER THREE

SCHOLARS, EQUESTRIANS, AND VETERINARIANS

A. SCHOLARS

1. *Introduction*

The writers of veterinary literature in the Mamluk period may be divided into three groups, which I have chosen to call scholars, men of horses, and veterinarians. The group of scholars, who might be defined as theoreticians, regarded the writing of at least one book on veterinary medicine as an integral part of their literary output, testifying to their broad knowledge in diverse spheres. The general world view of these scholars was that knowledge is not limited to one sphere; hence they turned their hand to writing books on a wide range of subjects, as befits the occupation of the scholar-philosopher. In general, writing a book on veterinary science and treatment of animals granted prestige to the scholar, reflected by the number of people who came from all over the Muslim world seeking to join his circle of students and receive *Ijāzah*, or the right to teach what they had learnt from him orally. These scholars mainly collected material written by authors from the near or distant past and organized it anew in a book of their own, with an introduction articulating their approach to the major subject discussed in the book. The materials that they collected and interpreted largely concern philological aspects and include explanation of names, epithets and general descriptions of animals. They also address in depth the connection between jihad and horses. Their works generally include some practical chapters dealing with issues such as treatment of animals, diagnosis of their diseases and preparation of medicines, but the authors generally declare that this was not their motivation for writing the book. The interest of most of these scholars in the practical application of veterinary knowledge was quite superficial, and they certainly did not engage in diagnosing illnesses or preparing medicines and liniments. Their main motive for writing, as most of them emphasize in their introductions, is related to the subject of Jihad and the animal that can help the warriors to defeat the infidels and spread the rule of Islam. The status of the horse, its description and its superiority over all the other animals is the hub of the

discussion in most of these works, even when they include medical information on the treatment of horses' illnesses. Thus, we see here a group of scholars who were mainly occupied with theological studies and bore official roles in the clerical sphere, such as Cadis, Muftis, *Fuqahā*, *ʿUlamā*, and teachers. The list of veterinary writers in this category is long, and I will present here a few of the more outstanding figures in terms of personal status and the importance of their works.

2. *Abū Muḥammad Sharaf al-Dīn ʿAbd al-Muʿmin b. Khalaf al-Dimyātī*¹
(613-705/1217-1306)

Al-Dimyātī, author of the book "*Faḍl al-khayl*" —The Superiority of Horses, is the foremost in the group of scholars who reached the highest status in religious and theological studies. Biographical essays from his period give his full name as ʿAbd al-Muʿmin b. Khalaf b. al-Ḥasan b. Sharaf al-Dīn al-Dimyātī, and his biography reveals a number of characteristics that were common to most of the intellectuals of the Mamluk period.² He was born at the end of 613/1216 (d. 705/1305)³ in the village of Tūnah in the Tannīs region,⁴ and grew up in Dimyāt, Egypt, hence the appellation al-Dimyātī. The sources often refer to him as Ibn Jamād, emphasizing his handsome appearance.⁵ Like many Muslim scholars of the Middle Ages, he studied mainly in religion and theology. In 636/1238 he went to live in Alexandria in order to study with a group of famous Hadīth scholars who had settled there. Later, he continued his voyage of learning and joined the circle of students of Ibn Muqīr and Ibn al-Mundhirī, who taught in Cairo. In 643/1245

¹ Bodl. L., *Ms. Marsh* 389 (203 folis.). The name of the copyist of this manuscript and the date (873/1486) appear on the last page. The copyist studied the treatise with an educated woman called Nashwān, who lived near the al-Azhar mosque and was the daughter of Sheikh Abū Muḥammad ʿAbd Allāh, the son of the Chief Cadi of Egypt ʿAlāʾ al-Dīn Abī al-Ḥasan ʿAlī al-Kuttābī al-Ḥanbalī. Another manuscript bears the following heading on the title page: *كتاب فضل الخيل وما يستحب وما يكره من ألوانها وشيائها وما جاء في كراهة لحومها وأباحتها وما ورد في سباقها وسهامها وصدقها*. تأليف الشيخ الإمام الأواحد الحافظ الرحلة شرف الدين بن محمد عبد المؤمن ابن خلف (ابن أبي الحسن الديماطي رحمه الله). See B.N., *Ms. Arabe*. 2876 (Suppl. ara. n^o, 992), fol. 1r^o.

² ʿAbd al-Muʿmin b. Khalaf b. Abī al-Ḥasan b. Sharaf al-Dīn Abū Aḥmad wa-Abū Muḥammad Sharaf al-Dīn See also G. Vajda, "al-Dimyātī," *E.I.*², vol. II (1965), pp. 292-293; Carl Brockelmann, *Geschichte der Arabischen Litteratur*, Leiden: E.J. Brill, 1949, vol. II, p. 88.

³ Ibn Hajar al-ʿAsqalānī, *al-Durar al-kāminah*, vol. II, pp. 417-418; al-Suyūṭī, *Ḥusn al-muhāḍarah*, vol. I, p. 357.

⁴ A marginal note by the editor of the biography by Ibn Hajar al-ʿAsqalānī says that his birthplace is given as Dimyāt in Egypt. Ibn Hajar al-ʿAsqalānī, *al-Durar al-kāminah*, vol. II, p. 417. See also Ibn al-ʿImād, *Shadharāt al-Dhahab*, vol. VI, p. 12.

⁵ Ibn Hajar al-ʿAsqalānī, *al-Durar al-kāminah*, vol. II, pp. 417-418.

he went on a pilgrimage to Mecca, during which he joined the circles of important teachers of religion who established their seat of learning in Mecca and Medina. After two years of study in Ḥijāz he returned (in 645/1247) to Egypt, and continued on his voyage of learning (*riḥlah fi ṭalab al-ʿilm*) to Syria, and then reached groups of teachers in Iraq. He acquired repute as a scholar who was very knowledgeable in religion and Hadith; he soon became a highly esteemed teacher, and many sought to join his circle of students, which naturally had a beneficial effect on his financial status. Al-Dimyāṭī possessed honorable status both during his lifetime and after his death in the year 705/1305.⁶

Among his important works we find a book that contains biographies of all the teachers and mentors from whom he had learnt in the course of his life, as well as a long list of biographies of other scholars of his generation. This monumental work, which comprises four volumes, furnishes comprehensive information about the period and is most illuminating with regard to the intellectual elite and the relations between the scholars. In the impressive list of teachers, numbering some 1250, we find the names of people who were the shining lights of their generation in the sphere of religion, such as Ibn al-Lawātī, Abū al-Naṣr Ibn al-Shīrāzī, and many others who granted him *ijāzah*—permission to quote Hadith traditions he heard from them. His talents, and especially his phenomenal memory, enabled him to occupy a leading role as a religious authority, and the long list of his writings shows that he was mainly occupied in teaching the tenets of religion and the Hadith.⁷ It is said of him that he was a prolific writer and even gave 20 volumes of his work as a gift to al-Ṣāghānī, another important scholar. In addition to his tractates on religion and religious laws, he wrote books on language, linguistics and philology. He was highly knowledgeable in genealogy, particularly in tracing the descent of ancient Arab tribes such as al-Aws wa-al-Khazraj, to whom he dedicated an entire book.

⁶ G. Vajda, who wrote a monograph on him, considers him the most important figure who engaged in collecting Ḥadīth traditions in the last third of the 7th century AH/ 13th century CE. See Vajda, "al-Dimyāṭī," p. 292-293.

⁷ A biography of al-Dimyāṭī written by Ibn Taghrī Birdī credits him with very many treatises, most of them dealing with religion and the Ḥadīth traditions. He also wrote some books on Arab tribes such as al-Aws wa-al-Khazraj, the Banū Nawfal, Banū Jumāh and others. In addition, he wrote a book on the life of the Prophet. Another important book that includes many biographies is "*al-ʿIqd al-muthamman fi-man ismuhu al-Mu'min*." Above all, Ibn Taghrī Birdī says that he studied al-Dimyāṭī's book on horses, *Faḍl al-khayl* under Taqī al-Dīn al-Maqrīzī in his home. Jamāl al-Dīn Abū al-Maḥāsin Ibn Taghrī Bardī, *al-Manhal al-ṣāfi wa-al-mustawfi ba'da al-wāfi*, ed. Muḥammad Amīn, an introduction by Sa'īd 'Abd al-Fattāh 'Ashūr, Cairo: Markaz Taḥqīq al-Turāth, 1993, vol. VII, pp. 367-373.

Al-Dimyātī's book on the superiority of horses, *Faḍl al-khayl*, is often quoted in the Mamluk chronicles, which emphasize that many scholars of the period learnt it by heart.⁸ The many references to this book that appear in various sources attest to al-Dimyātī's vast influence on scholars of horse literature, even beyond the borders of the Mamluk Empire. Scholars from Muslim Spain also studied this book and used it as a basis for works they wrote on horses or *furūsīyah*. One of these was Ibn Hudhayl al-Andalusī (14th century), who declares that he used al-Dimyātī's treatise as a basis when writing his book on horses, *Hibyyat al-fursān wa-shi'ār al-shuj'ān*, which he dedicated to the Andalusian ruler al-Musta'in billāh.⁹ We may assume that many scholars who sought admission to the Mamluk court studied this book in order to raise their chances of joining the service of Mamluk sultans and emirs, who were known for their love of horses. Presumably, those scholars who learnt the book by heart were not seeking to learn how to treat horses and had no intention of engaging in the veterinary profession; rather, they sought to make an impression on the rulers in the *Adab* centres. It appears that Mamluk sultans and many emirs from the ruling class liked to hear discussions based on expert knowledge of horses and hunting animals at the study sessions and banquets they held in their palaces. There is no direct or indirect evidence indicating to what extent the information in the book was useful in the medical practise of veterinarians of the period, and al-Dimyātī's name does not appear in the professional treatise of Abū Bakr al-Bayṭār, the only writer of veterinary literature in the Mamluk period who is also known to have been a practicing veterinarian, as will be discussed later.

The title of al-Dimyātī's treatise suggests that it is a book in praise of the horse, placing it at the top of the hierarchy of creatures after man. This assumption is confirmed by an examination of the Oxford manuscript, in which most of the content of the treatise concerns the horse, mostly based on sayings of the Prophet and various religious decrees relating to the horse and emphasizing the importance of its role in holy wars.¹⁰ These traditions specify the rights of a horse that takes part in battles, especially its right to receive part of the booty of the war in which it took part. The book also gives

⁸ Ibn Tighrī Birdī, *Hawādith al-duhūr*, vol. I, p. 76.

⁹ See Ibn Hudhayl al-Andalusī, *Hibyat al-Fursān wa-Shi'ār al-Shuj'ān*, Beirut: Dār al-Intishār, 1997, p. 9.

¹⁰ Bodl. L., *Ms. Marsh* 389 (203 folios): كتاب فضل الخيل وما يستحب وما يكره من ألوانها وشياتها: وما جاء في كراهة أكل لحومها وإباحتها وما ورد في سباقها وسهامها وصدقاتها تأليف: أبي محمد عبد المؤمن بن خلف (الدمياطي).

the names of many horses that the author drew from Arabic sources from the *Jāhili* period and the beginning of Islam. In this context, he includes the names of the Prophet's horses as well as names of other animals in his possession, such as mules, donkeys, camels, and even sheep that he bred. The treatise contains hardly any medical material with the exception of subjects such as castration of animals, or identifying the type of horse by its external physical condition. Hence, this book may be defined as *Adab* because its contents are similar to those of many classical tractates that were collected in *Adab* anthologies at the beginning of the Abbasid period (especially at the beginning of the ninth century), such as the books of al-Aṣma'i, Abū 'Ubaydah, Ibn al-Kalbī, Ibn al-A'rābī, and many others.

Salient evidence of the importance of al-Dimyāṭī's book and of the obligation of educated people in that period to know and learn it can be found in the chronicle of Ibn Taghrī Birdī (d. 874/1470), who was one of the more important chroniclers of the Mamluk period. He states that he learnt al-Dimyāṭī's *Faḍl al-Khayl* by heart, and even recited its contents to al-Maqrīzī, who was himself an important chronicler of the period. He states explicitly that he "heard from the mouth of" al-Maqrīzī the entire contents of *Faḍl al-Khayl*, the work of al-Ḥāfiẓ Sharaf al-Dīn al-Dimyāṭī.¹¹ The author was even granted by his teacher the right to teach the contents of the treatise and convey it to his students. The question arises as to what these chroniclers, whose area of expertise was history and description of events from the past or the present, had to do with this kind of material on horses? The answer is not clear-cut, and we find a partial explanation in Ibn Taghrī Birdī's description of the various public positions held by al-Maqrīzī in his lifetime. One of his most important roles was that of Inspector of Markets. This role carried great prestige, and its bearer had to be knowledgeable in a variety of spheres. The inspector was also responsible for everything connected with trade in animals and he supervised the professionals involved, including the veterinarians. Therefore he had to study and be familiar with treatises like those of al-Dimyāṭī, although knowing the material by heart does not necessarily entail practicing veterinary medicine or medicine at all. There is no evidence that al-Maqrīzī and Ibn Taghrī Birdī engaged in veterinary medicine, despite their familiarity with the knowledge contained in al-Dimyāṭī's veterinary book. It seems that at least theoretical knowledge concerning horses was considered important enough for eminent scholars to want to learn and teach it.

¹¹ Ibn Tighrī Birdī, *Ḥawādith al-duḥūr*, vol. I, p. 67.

Ibn Taghrī Birdī describes al-Maqrīzī as a man with a keen sense of humour. He uses the expression “*fakih al-munādamah*”¹² referring to a characteristic that accounts to a large extent for al-Maqrīzī’s success in the Mamluk court. This is a basic characteristic that could give him entry to the Mamluk sultan’s service as a *nadīm*—a Member of the Royal Banquet. Al-Maqrīzī certainly did not receive this role because of his expertise in matters of religion, which brought him great esteem and earned him the title of *cadi*, but because of his erudition in other areas, such as *Adab*, poetry, anecdotes, and knowledge of ancient history. But it seems that, above all, it was his expert knowledge on horses, which he had learnt from al-Dimyātī’s treatise, that endeared him to the rulers, whose fondness for horses and hunting was well known.

Not only scholars and intellectuals at the level of al-Maqrīzī and Ibn Taghrī Birdī regarded the study of al-Dimyātī’s book as something that could grant them prestige, but also people belonging to the Mamluk group itself, and even those who held high military ranks. For example, some sources mention that senior emirs studied the book on horses under al-Dimyātī himself. One of these was Emir Sayf al-Dīn Abū Bakr, son of emir Sayf al-Dīn Muḥammad b. Ḥasan al-Kurdī, known as Ibn al-Raddādī, who was personally tutored by al-Dimyātī on his book on horses, and on finishing his studies received permission to teach it in his turn.¹³

The list of al-Dimyātī’s students is certainly impressive, and many of them engaged in diverse disciplines.¹⁴ For example, Ibn Abī Bakr b. Abī al-Ḥusayn al-Mālikī of Alexandria (b. 654/1256), studied the book under al-Dimyātī and received his permission to teach it himself. This man was renowned as a linguist and grammarian, he wrote a comprehensive book of exegesis of the Koran and became *persona grata* in the courts of various Mamluk rulers in Cairo and Damascus.¹⁵ Such religious knowledge, which features in al-Dimyātī’s book on horses, was not the province of veterinary practitioners but was rather pursued among scholars and intellectuals.

¹² *Ibid.*, p. 66.

¹³ Ibn Khallikān, *Wafayāt al-a’yān*, vol. I, p. 166.

¹⁴ Al-Dimyātī’s reputation as a teacher is often mentioned in the biographies of people of the 8th/14th century written by Ibn Ḥajar al-ʿAsqalānī. Among the names that appear we find a broad range of role bearers, scholars, emirs, and even women who received his permission to teach (*ijāzah*). See Ibn Ḥajar al-ʿAsqalānī, *al-Durar al-kāminah*, vol. I, p. 14, vol. II, p. 126, vol. III, pp. 79, 104, 149, 288, 363, 371, 477, vol. IV, pp. 60, 104, 284, etc.

¹⁵ Ibn Khallikān, *Wafayāt al-a’yān*, vol. I, p. 388.

3. *Abū al-Thanā' Shihāb al-Dīn al-Ḥalabī*¹⁶

Another important figure in the group of scholars who wrote about horses is Shihāb al-Dīn, who was born in 644/1246 and died in Damascus on the 22nd of Shaʿbān 725/1324. Like al-Dimyāṭī, he studied with the great religious scholars of his generation, such as al-Raḍiyy b. al-Burhān, Yaḥyā b. Ibn ʿAbd al-Raḥmān al-Ḥanbalī, Ibn Manjā and Jamāl al-Dīn Ibn Mālīk. From the latter, and also from Ibn Zāhir he learnt about *Adab* and received permission (*ijāzah*) from his teacher, Ibn Khalīl, to teach it. He soon became prominent for his many skills and was appointed Cadi of the *Ḥanbalī* School. He surpassed many of his contemporaries in creativity and in different genres of classical literature—poetry, prose and calligraphy. At some stage he was appointed to an official role in the Mamluk sultan's court as clerk in the bureau of official correspondence, *Diwān al-Inshāʾ*, first in Damascus and later in Cairo, to which he was transferred by Ibn al-Salamūs after the death of Muḥyī al-Dīn b. ʿAbd al-Zāhir, whom he succeeded as the writer of official contracts and composer of the sultan's letters. Due to his excellence in this role he was raised in rank and appointed clerk in the *Diwān al-sirr*—the bureau of correspondence in Damascus, after the death of Sharaf al-Dīn b. Abī Faḍl Allāh, and he remained in this role until he died.¹⁷

Shihāb al-Dīn is described in the biographical sources as a great scholar, a pious and virtuous man. He was highly respected and many of the Mamluk rulers, especially the governor of Damascus, held him in great esteem. Al-Ṣafadī, for example, is effusive in praising his erudition and talent in many fields such as religion, language, poetry, prose, and as a biographer. He was also expert in deciphering manuscripts. He wrote a book summarizing the rules of writing and composition of texts. He is described as a brilliant calligrapher who wrote the sultan's edicts directly on paper without first making a draft as all the other officials did. This gave him senior status among the clerks in the Mamluk service. Due to this expertise, it is said, most of the edicts issued by the governor in Damascus were written by him. His calligraphic skill led many of his generation, after his death, to search for and collect letters written in his hand, and there were some who collected whole volumes of such documents. Shihāb al-Dīn also wrote poetry, and composed 1365 rhymed verses in praise of the prophet Muḥammad and his family—*Madāʾiḥ Nabawīyah*. He also wrote a book on Bullets (*Bunduq*),

¹⁶ The full name of this scholar, as it appears in the sources, is Muḥammad b. Salmān b. Fahd b. Maḥmūd al-Ḥalabī al-Dimashqī Abū al-Thanā' Shihāb al-Dīn. See Ibn Ḥajar al-ʿAsqalānī, *al-Durar al-kāminah*, vol. IV, pp. 324–326.

¹⁷ *Ibid.*

discussing issues related to *furūsīyah*, hunting and entertainment.¹⁸

Shihāb al-Dīn's book on horses is described in the sources as one of the best books on the subject. Ibn Sayyid al-Nās remarks that the two most important persons of their generation were Shihāb al-Dīn and al-Dimyātī, and, quoting Ibn Salmah al-Gharnāṭī, points to Shihāb al-Dīn as the more important of the two.¹⁹ Perhaps al-Dimyātī and Shihāb al-Dīn never mounted a horse by order of the sultan in order to compete over who was more knowledgeable concerning their subject matter, as al-Aṣma'ī and Abū 'Ubaydah had to do,²⁰ but it may be assumed that their motivation for writing such books was the demand for this kind of literature in court circles.

4. *Lisān al-Dīn b. al-Khaṭīb*

Although Lisān al-Dīn did not function within the Mamluk Empire, he was one of the scholars of that period and he had considerable influence

¹⁸ *Ibid.*, p. 326.

¹⁹ *Ibid.*

²⁰ Al-Aṣma'ī presented his book on animals –*Kitāb al-Wuḥūsh*—to al-Afḍal, the chief vizier of the Abbasid caliph Hārūn (or al-Ma'mūn) and was asked what reward he hoped to receive. He answered one *jild*, amounting to (according to *Lisān al-'arab*) one adult female camel or one sheep. The vizier was surprised by al-Aṣma'ī's modesty and said that his literary rival, Abū 'Ubaydah, who had also written a book on animals, had asked for 50 *jilds* in exchange for his book, which was similar to that of al-Aṣma'ī. The vizier sent for the two books in order to test both writers on their expertise. He ordered a horse to be brought and asked Abū 'Ubaydah, to point to the parts of the horse's body as he read from the book. Abū 'Ubaydah exempted himself from the test, saying that he was not a veterinarian and his work consisted in collecting material from the Bedouin Arabs, defining himself as a writer of literature and a collector of information. In contrast, al-Aṣma'ī, who had also acquired fame as one of the greatest anthologists and collectors of information from the Bedouins and Arabs, immediately jumped onto the horse that was standing near the vizier and began to point to every part of its body, saying its name and adding a few verses of poetry that referred to its name or its description as it appeared in his treatise. Thus he demonstrated his profound practical knowledge on the material he had written. Al-Aṣma'ī's expert anatomical knowledge, and its adaptation to his linguistic talents do not necessarily indicate that he actually engaged in veterinary work, but they certainly illustrate the difference between these two important authors. See Abū al-Faraj 'Abd al-Rahmān b. 'Alī b. Muḥammad Ibn al-Jawzī (d. 597/1201), *al-Muntazam fī tā'rikh al-mulūk wa-al-umam*, ed. Muḥammad 'Abd al-Qādir 'Aṭā and others, Beirut: Dār al-Kutub al-Ilmiyah, 1992, vol. X, p. 225. There are several versions of this story in the classical sources, but they all emphasize al-Aṣma'ī's expert knowledge of horses in contrast with his rival. Ibn Khallikān, *Wafayāt al-a'yān*, vol. III, p. 172 (al-Aṣma'ī); vol. V, pp. 236-237 (Abū 'Ubaydah Mu'ammār b. al-Muthannā al-Baṣrī) [Beirut: Dār Ṣādir 1969-1970]; See also Muḥammad Rāghib al-Ṭabbākh's introduction to al-Dimyātī's book *Faḍl al-khayl* that was published in Aleppo in 1930: Sharaf al-Dīn 'Abd al-Mu'min al-Dimyātī al-Miṣrī, *Faḍl al-khayl*, ed. Muḥammad Rāghib al-Ṭabbākh, Aleppo: al-Maṭba'ah al-Ilmiyah, 1930, p. 3-4.

in that empire.²¹ Ibn al-Khaṭīb was born in 713/1313 in the town of Lucia in southern Granada, Andalusia, and was brought up in Granada. His family moved there because his father was an official in the court of Banū Naṣr, the rulers of Granada. He soon achieved fame as one of the greatest writers and scholars of his generation. He was appointed to a ministerial post several times under the rule of Banū Naṣr and his life was full of ups and downs, oscillating between glory and rejection, persecution and even incarceration in prison, where he came to a bitter end. He was killed in prison in 776/1374. His treatise on the history of Granada, *al-Iḥāṭah fī akhbār Gharnāṭah* is one of the most comprehensive works on the history of the region and particularly on the capital of Andalusia during the reign of Banū Naṣr. The book contains a great deal of information about people from the ruling classes, about writers of the period, and especially about the members of the ruling Naṣr family, as well as names and illuminating details about kings who reigned at that time in the various kingdoms of the Maghreb, Tunis and Spain. He wrote over 60 treatises, many of them dealing with *Adab* literature, biographies and history, which were highly valued by scholars of his period and are still valued today, and many assert that he surpassed all his contemporaries in terms of quality and expertise in the various disciplines he pursued.

We can learn a great deal about Ibn al-Khaṭīb and his corpus of over sixty books from al-Maqqarī al-Tilmisānī (d. 1041/1631). Referring to the book *Bustān al-Duwal*—Garden of the Nations, al-Maqqarī describes its subject as the strangest he has ever encountered. He says that Ibn al-Khaṭīb arranged the contents according to the order of their importance and necessity for the ruling system. This treatise reveals Ibn al-Khaṭīb's expertise on the subject and helps us to understand the complexity of the ruling systems and the various institutions in Medieval Muslim society, as perceived by Ibn al-Khaṭīb. In the book he lists the different professional services that every ruler needs in his daily life, including the professions of medicine, pharmacy, chess, astrology and divination, falconry, veterinary medicine, agriculture, music and song. With regard to veterinary medicine and falconry, he declares that these are not simply essential for a ruler in the course of his ongoing activity and therefore these professionals are part of the regular

²¹ Abu al-ʿAbbās Aḥmad b. Muḥammad al-Maqqarī al-Tilmisānī, *Naḥḥ al-ṭib min ghuṣn al-Andalus al-raṭīb*, ed. Iḥsān ʿAbbās, Beirut, 1381/1967, vol. VII, p. 101; Carl Brokelmann, *Tārīkh al-adab al-ʿarabī*, trans. Gharīb Muḥammad Gharīb and others, Cairo: al-Hayʾah al-Miṣriyah al-ʿAmmah li-al-Kitāb, 1995, vol. VII (12), pp. 523-530; *Idem*, *Geschichte arabischen Litteratur*, Leiden: E.J. Brill, 1949, vol. II, pp. 337-340, and supplement II (1938), p. 372; Muḥammad al-ʿArabī al-Khaṭṭābī, *al-Ṭibb wa-al-aṭibbāʾ fī al-Andalus al-islāmīyah: dirāsah wa-tarājīm wa-nuṣūṣ*, Beirut: Dār al-Gharb al-Islāmī, 1988, vol. II, pp. 191-194.

staff of court employees, but that they are mandatory for anyone who wishes to be admitted to the court and serve the ruler as a *nadīm* and a companion of the Benquet. Other issues that he addresses in this book belong to the sphere of religion, especially matters of religious law and prayer.²²

Besides this treatise, Ibn al-Khaṭīb wrote books on administration of the state and supervision of the systems that ensure the prosperous existence of an economically viable society, a '*ḥisbah*'. In one book he describes the role of the *muḥtasib*, the inspector of markets and artisans, which included inspection of trade, quality and type of merchandise, prices, quality of the currency used, supervision of the professionals who worked in the city, such as doctors, pharmacists, bloodletters, and also various artisans.²³

Al-Khaṭīb's large literary output testifies to his broad education, and especially to his expertise in the life of the court and the matters that every member of the court had to know well. His position as chief vizier of the court and his familiarity with the ruling system rendered him highly knowledgeable on the topics he wrote about, such as pharmacology, the Theriac, the plague, music, veterinary science, and falconry.²⁴ Clearly, the fact that Ibn al-Khaṭīb wrote on these subjects, as on many others, does not prove that he engaged in them. On the contrary, it characterizes the prevailing spirit of the scholars and thinkers of that time, who chose to include among their literary works a broad range of subjects as proof of their extensive education.²⁵

5. *Abū al-Ḥafṣ 'Umar al-Balqīnī al-Shāfi'ī*

The full name of this writer is 'Umar b. Raslān b. Nuṣayr b. Šāliḥ, Sirāj al-Dīn abū al- Ḥafṣ al-kinānī al-Balqīnī al-Shāfi'ī (724-805/1324-1403). He studied in Cairo under the great teachers of the period, such as Ibn 'Uqayl whose daughter he married. He served as *Nā'ib*—deputy—to Ibn 'Uqayl when the latter was appointed Chief Cadi in 759/1358. In the year 765/1363

²² See al-Maqqarī al-Tilmisānī, *Nafḥ al-ṭīb*, vol. VII, pp. 97-98.

²³ *Ibid.*, pp. 97-102.

²⁴ *Ibid.*, p. 99.

²⁵ A modern scholar, Muḥammad al-'Arabī al-Khaṭṭābī, mentions two treatises of Ibn al-Khaṭīb, *al-Bayṭarah* and *al-Bayzarah* in the list of his medical treatises. He also states that he did not engage in his profession as a doctor because of his many duties in the political sphere and his role as chief vizier under the Naṣris rule in Granada. This scholar adds that Ibn al-Khaṭīb was also a physician in the court of Sultan Abū Abd Allāh Muḥammad al-Ghanī billāh al-Naṣrī (755-793/1354-1391) in Granada while he was a senior vizier, but he barely mentions al-Khaṭīb's veterinary work. See al-Khaṭṭābī, *al-Ṭibb wa-al-aṭibbā'*, vol. II, pp. 191-194.

al-Balqīnī was appointed Mufti in *Dār al-ʿAdl*, the highest court of Islamic law in Mamluk Egypt, and he soon became one of the most eminent figures of his generation in religious law. Despite his status and prestige, he did not secure the position of Chief Cadi of Cairo, but was appointed Chief Cadi of Damascus in 769/1367-8. On returning to Cairo, he obtained the lesser position of Cadi (*Qādī*) *al-ʿAskar*, a role in which he was succeeded by some of his sons and grandsons.²⁶ He also held several other positions and was in great demand as a teacher of religion in the various schools of Cairo. Towards the end of his life he was granted the prestigious title of *Shaykh al-Islām*, attesting to the great honor in which he was held by many, and a mark of recognition of his high status, which was equal to that of Chief Cadi in the opinion of his admirers.²⁷

According to al-Balqīnī's biographer, he belonged to a group of scholars who dealt mainly with religion and religious laws. Writing a book on animals and veterinary medicine was regarded as one of the components of his broad education, erudition, and wide horizons. His book *Bayṭarnāmih* is also referred to in the manuscript by other names, *Qaṭr al-Nadā* (Dewdrops), and *Qaṭr al-Sayl bi-Amr al-Khayl* (Drops of water about horses).²⁸ Like al-Dim'yāṭī

²⁶ The full name of al-Balqīnī is 'Abd al-Rahmān b. 'Umar b. Raslān b. Nuṣayr b. Šālīḥ Abū al-Faḍl Ibn al-Sarrāj Abū al-Ḥafṣ 'Umar al-Balqīnī Sibṭ Ibn 'Uqayl. He was born on the 25th of Ramadan 763 (1361 CE), and died in 834 (1430). His brother, 'Alam al-Dīn, in a biography that he wrote, says that he was a wise Imam with broad and precise knowledge of grammar and of the various aspects of religion. Remarking on his excellent memory, the sources mention in particular that he knew by heart many of the sayings of the Prophet. They also refer to his wide knowledge of religious laws, saying that he was cognizant of all the secrets of the Shāfi'ī school, to which he belonged. He is described as a handsome man with a clear high voice, who was an excellent teacher. He was a prolific writer; most of his books deal with various aspects of religion, such as interpretation of religious law and Hadith (genuine sayings of the Prophet), which he gathered and summarized. See Shams al-Dīn Muḥammad b. 'Alī b. Aḥmad al-Dā'ūdī (d. 945H), *Ṭabaqāt al-Mufasssīn*, ed. 'Alī Muḥammad 'Umar, Cairo: Maktabat Wahbah, 1392/1972, vol. I, pp. 276-277; al-Suyūṭī, *Ḥusn al-muḥādarah*, vol. I, p. 438; Ibn al-'Amīd, *Shadharāt al-dhahab*, vol. VII, p. 166; Shams al-Dīn Muḥammad b. 'Abd al-Rahmān al-Sakhāwī, *al-Daw' al-lāmi' li-aḥl al-qarn al-tāsi'*, [ʿan Naskhat Dār al-Kutub al-Miṣriyah al-Muqābilah bi-Naskhat al-Khizānah al-Zāhiriyyah fī Dimashq wa-al-Naskhah al-Aṣfiyah fī al-Hind], Cairo: Maktabat al-Qudsī, 1354 H, vol. IV, pp. 106-113 (tarjamah 301). The biography of his father, 'Umar b. Raslān Abū Ḥafṣ al-Balqīnī (d. 850/1402) mentions that he, too, bore the title *Shaykh al-Islām*. He also built a school named after himself, where he taught religion and theological studies. See Ibn Taghrī Birdī, *al-Manhal al-ṣāfi*, vol. I, p. 497; al-Dā'ūdī, *Ṭabaqāt al-mufasssīn*, vol. II, pp. 276-277 (tarjamah 385).

²⁷ Ibn Ḥajar al-'Asqalānī, *al-Durar al-kāminah*, vol. II, pp. 267, 427 (Sirāj al-Dīn al-Balqīnī).

²⁸ Bodl. L., Ms. Marsh 487, fol. 1r°. This manuscript is the third in a microfilm that includes several manuscripts that do not deal with veterinary medicine: "كتاب قطر السيل في أمر الخيل للبلقيني رضي الله عنه أمين — كتاب يطرنامه المسعى بقطر السيل، تأليف سيدنا ومولانا وشيخنا البلقيني" (توفي كتاب يطرنامه) fol. 1 v°. (عام 805 هـ / 1402 م واسمه بالكامل سراج الدين عمر بن رسلان بن نصر البلقيني الشافعي)

and Shihāb al-Dīn, he was mainly interested in gathering material on horses from ancient sources, emphasizing contents based on religious and *Adab* sources, such as verses from the Koran, sayings of the Prophet, pre-Islamic traditions, poems on horses, and above all, everything connected with Jihad. There is also specifically veterinary material, mainly related to the training or identification of thoroughbred horses, as well as classic philological material dealing with names of organs and names of horse belonging to the *Jāhilīyah* culture and the early Islamic period, descriptions of horses' external characteristics, colours, and so forth. It may be assumed that an educated man of al-Balqīnī's stature saw the study of such material as a means of expanding his education and expertise in subjects that were important to society in his day, especially to the rulers. Such information on horses also afforded him entry to the Mamluk courts, in which horses played a major part.

In the introduction, al-Balqīnī writes that his book is based mainly on the treatise of al-Shaykh Sharaf al-Dīn al-Dimyāṭī, and that he added some things to the original treatise in order to make it easier to use, but he does not explain whether he has simplified the material for an audience of students or whether he has made it easier for veterinarians to use the book.²⁹ His book includes a wealth of material on religion, based mainly on religious sources that refer to horses, such as volumes of the Hadith, verses from the Koran and various religious edicts, while also relating in detail to the four schools in Sunni Islam. A description of the structure of the book leaves no doubt that it was written by an author who specialized in religious material, as it is based almost entirely on religious sources in which he was highly knowledgeable. The book comprises seven chapters:

Chapter 1, *Irtibāṭ al-khayl*, meaning 'employing horses in the holy war'. This chapter discusses the desirable characteristics of horses, their preferable colours, their description, unsuitable traits, external appearance and names of horses.

Chapter 2 describes the kind of horses that are suitable for Jihad, recommending how to stroke their necks and bodies while talking about the blessing that they bring, the money that has to be spent on their food and wellbeing, how they should be served, and so forth.

المسمى بقطر السيل تأليف سيدنا ومولانا وشيخنا شيخ الاسلام وبقية العلماء الاعلام اوجده المجتهدين، قانع المبتدئين، ناصر الحق، امام السنة، سراج الملة والدين، ابو الحفص عمر البلقيني الشافعي رضي الله عنه وأرضاه وعامله بالطافه ومنحه (وسيره؟) واسعافه.

²⁹ See Bodl. L., *Ms. Marsh* 487, fol. 1v^o.

Chapter 3 discusses the Prophet's love of horses, his tendency to keep them for holy wars, and mentions the name of the first man who rode them.

Chapter 4 deals with the breeding of horses and mentions situations in which it is necessary to choose mares and stallions for breeding.

Chapter 5 discusses various subjects, such as the prohibition on castrating horses, on hurting or humiliating them, on cropping their tails or cutting off other parts of their body. In other words, it deals with the prohibition on maltreating horses and even discusses the issue of permitting the eating of horse meat in terms of ritual purity.

Chapter 6 discusses what is permitted and what is forbidden in horse racing.

Chapter 7 deals with the religious decrees concerning the rights of a horse owner who takes his horse into holy war, what share of the booty he is entitled to after the war, and whether he has to pay taxes on the booty that he receives.³⁰

6. *Al-Nāshirī, Abū ‘Abd Allāh Hamzah b. ‘Abd Allāh b. Muhammad*

Abū ‘Abd Allāh Ḥamzah b. ‘Abd Allāh b. Muḥammad al-Nāshiri was born in 833/1429 in the region of Nakhl al-Dawlah Zubayd in Yemen, and died in 926/1520 in Zubayd. He lived to be 100, married several times and fathered many children, as recounted by the biographical sources.³¹ He is said to have studied under the greatest teachers, especially Yemenite ones, many of whom belonged to his family, which was renowned as a family of distinguished scholars. Many of his relatives served in high-ranking government positions. His grandfather, for example, Muwaffaq al-Dīn ‘Alī b. Abī Nāshir, known as *Shaykh al-Islām*, was one of the greatest scholars in Yemen, which was then under Mamluk influence, and many other members of the family officiated in senior roles and were appointed Cadis in important positions. Al-Nāshiri traveled a great deal in search of prominent teachers throughout the Muslim world, and thus he studied under the

³⁰ *Ibid.*, fol. 52r°. On this matter, al-Balqīnī relies mainly on the two Sunni schools, the Mālikī and the Shāfiʿī (fol. 65r°). The last page of the manuscript (fol. 65v°) contains the colophon and the date of the copy (919/1513) “وافق الفراغ من نسخه على يد الفقير الى الله تعالى المعترف { } بالشافي غفر الله له ولوالديه ولمن نظر فيه بالتقصير في حق مولاه ووالديه محمد عبد الفايكه؟ (ع) { } الفهي (؟) الشافي غفر الله له ولوالديه ولمن نظر فيه { } ودعا له بالتوبة والمغفرة وجميع المسلمين آمين في ثالث عشر من رمضان المعظم من تسعة عشر وتسعين”. See Bodl. L., *Ms. Marsh* 487, fols. 53r°, 65r°–65v°.

³¹ Al-Nāshirī, *Intihāz al-furās*, pp. 7-9 (introduction); al-Sakhāwī, *al-Daw' al-lāmi'*, vol. III, pp. 164-165; Ibn al-ʿAmīd, *Shdharāt al-dhahab*, vol. VII, p. 142; Ḥājī Khalifah, *Kashf al-zunūn*, vol. V, p. 337.

luminaries of his generation in Egypt, Syria and Hejaz, for example, Ibn Ḥajar al-ʿAsqalānī, Zakariyyā al-Anṣārī, al-Jawharī, al-Suyūṭī, al-Sakhāwī and many others. Like most of the scholars of his period, his education was basically religious and focused on religious laws and observance.³²

His biography reveals his mastery of two branches of knowledge. The first consists of subjects called in Arabic *ʿulūm naqlīyah*—knowledge handed down through generations, or from teacher to student or friend to friend, which formed the basis for the study of religion and oral traditions. The second comprises disciplines based on reasoning and logic, in Arabic *ʿulūm ʿaqlīyah*. These include sciences such as medicine, mathematics, engineering, philosophy, astrology and divination. Most of al-Nāshirī's treatises belong to the first category, religion and religious tradition, but although he was distinctly a man of religion who served as a Cadi and a mufti, he also wrote other prose and poetry.³³

Al-Nāshirī's book on hunting, *Kitāb intihāz al-furaṣ fī al-ṣayd wa-al-qanṣ* (Taking advantage of opportunities in hunting and catching animals), was written for the Yemenite ruler ʿĀmir b. Ṭāhir (d. 1464), the first Ṭāhiri's ruler in Yemen.³⁴ This book comprises eight chapters apart from the introduction. It deals mainly with issues related to hunting in their religious context, and is based for the most part on religious and literary sources.³⁵ Al-Nāshirī states in his introduction that he added at the end a section dealing with illnesses of hunting birds and methods of treating them. This section is very brief (less than four pages), and contains nothing innovative in medicine.³⁶ Moreover, there is no mention in it of any of the sources he used, in contrast to the other chapters, where al-Nāshirī mentions his sources in almost every case, especially in the case of religious material. This, perhaps, indicates a somewhat disparaging attitude on his part to material that does not belong to his main field of scholarship—religion and religious tradition.

³² *Ibid.*

³³ *Ibid.*

³⁴ Al-Nāshirī, *Intihāz al-furaṣ*, pp. 11–12.

³⁵ Chapter I: verses from the Koran that refer to hunting. Chapter II: Hadith traditions quoted from the Prophet. Chapter III: the names of all those who hunted among the prophets, friends of the Prophet, caliphs and kings. Chapter IV: names of hunting animals and birds and a description of hunting methods. Chapter V: names of animals that are ritually pure for hunting in the sea and on land. Chapter VI: Muslim religious laws related to the use of animals in hunting. Chapter VII: stories and anecdotes about hunting. Chapter VIII: poems about hunting.

³⁶ Al-Nāshirī, *Intihāz al-furaṣ*, pp. 202–205.

B. THE EQUESTRIANS

Unlike the first group of veterinary writers, scholars who engaged in writing as part of their religious education, the second group were motivated mainly by their involvement in hunting and *furūsīyah* and their love of horseback riding. In general, these were people who belonged to the upper classes and were skilled equestrians. Some of them held senior roles in the political system, such as viziers, kings, emirs and military commanders, which enabled them to indulge in this expensive pastime and gave them entry to government circles. These authors usually emphasize that their books are based on personal experience of *furūsīyah*. Apparently, some of them considered that writing a veterinary book would add to their prestige as educated people beyond their engagement in military matters. Salient among these are the king of Yemen, al-Malik al-Mujāhid, and al-Şāhib Tāj al-Dīn, who was an important vizier in the Mamluk courts.

This group consists of two types of authors, according to their occupation and social status. The first type wrote books on falconry and hunting, with long chapters on the definition and identification of hunting birds, as well as medical chapters dealing with the diagnosis and treatment of diseases. The second type of authors were those who dealt with horses. This group includes some with high social status, and there is even a king, as well as a vizier and a horseback warrior. The writers presented below reflect to a large extent the importance of this sphere of interest in high society, which could afford to engage in such activities.

1. *Al-Malik al-Ashraf, ʿUmar b. Yūsuf al-Rasūlī al-Ghassānī, Writer of al-Mughnī fī al-Bayṭarah*

One author of a veterinary book, al-Malik al-Ashraf Abū al-Faṭḥ (his full name was ʿUmar b. al-Muẓaffar Yūsuf b. Mansūr ʿUmar b. ʿAlī b. Rasūl al-Ghassānī al-Jafnī), was the third ruler of the Rasūlīd dynasty and the eldest son of King al-Muẓaffar Yūsuf (d. 694/1295), and also his favorite according to most of the sources. The exact birth date of al-Malik al-Ashraf is not known, but the year of his death has been ascertained as 696/1296. This king belonged to the Rasūlī dynasty, which claimed to trace its descent to the Ghassānī tribe, belonging to Banū Asad who were converted to Christianity during the period of the second Caliph ʿUmar b. al-Khaṭṭāb and went to live in the territories of the Byzantine Empire. These people became assimilated into Turkmen tribes and eventually lost their Arab identity. The father of the dynasty, Muḥammad b. Hārūn, moved to Iraq

with his family, and from there to Syria, and finally reached Egypt in the Ayyubid period (569-648/1174-1250). If this is the case, their Arab lineage is not proven, and apparently they were a dynasty of Turkish origin from the Ughuz tribe. The sons of Muḥammad b. Hārūn served the Ayyubids and were nominated emirs and landowners in Yemen. When the last of the Ayyubid rulers left Yemen for Damascus in 626 (1228-9), he appointed a member of this dynasty, Nūr al-Dīn ʿUmar to replace him, and the latter soon became the independent ruler of Yemen. In 632/1235, he secured an appointment to govern on behalf of the Abbasid caliph al-Mustanṣir, thus turning northern Yemen into a Rasūlid kingdom for over two hundred years.

The Rasūlid reign became one of the glorious periods of Yemen in terms of culture, building, commerce and security. Several sons of the family were enlightened kings and great patrons of scholars and artists who worked in their court. Some even turned their hand to writing and literary and scientific production.³⁷ Al-Malik al-Ashraf's father, al-Malik al-Muẓaffar Yūsuf, also wrote books on various subjects, such as a collection of Hadith, a medical treatise, a tractate on the movement of the stars in the sky, and an *Adab* book entitled *Mufākahat al-Jālisūn*. Another book of his, *Fuṣūl Majmū'ah fī al-Anwā' wa-al-Zurū' wa-al-Aḥṣād*, covers a variety of subjects such as astronomy, astrology, calculation by astrolabe, agriculture, wild animals, farm animals, and geography. Al-Malik al-Ashraf Ismā'il (803/1401) wrote an important chronicle on the history of Yemen, especially on the Rasūlid dynasty, *Fākihat al-zamān wa-mufākahat al-ādāb wa-al-fitan fī akhbār man malak al-Yaman*.³⁸ Another king, al-Malik al-Muẓaffar Yūsuf b. ʿUmar (d. 858/1454), the thirteenth in the Rasūli dynasty, wrote a treatise on pharmacology, *al-Mu'tamad fī al-adwiyah al-mufradah* (The Reliable Authority on Separate Medicaments).

During his father's reign, ʿUmar b. al-Muẓaffar Yūsuf was governor of the al-Muhjam region, and later also of the Sana'a region. In a festive ceremony held in 694/1295, his father named him his successor and even signed an official document as proof.³⁹ The chronicler Abū al-Fidā, listing the

³⁷ G.R. Smith, "Rasūlids," *E.I.*², vol. VIII, p. 455; al-Qalqashandī, *Ṣubḥ al-a'shā*, vol. V, pp. 30-37.

³⁸ *Ibid.*

³⁹ This document appears in sources which state that one year before his death, King al-Muẓaffar named his son heir to the throne. See al-Qalqashandī, *Ṣubḥ al-a'shā*, vol. V, p. 31; Abū Muḥammad ʿAbd Allāh al-Ṭayyib b. ʿAbd Allāh b. Aḥmad Abī Maḥzamah (1465-1540), *Tārīkh thaghr ʿAdan ma' nukhabh min tawārīkh ibn al-Mujāwir wa-al-Jundī wa-al-Ahdal*, ed: Oscar Löfgren, Leiden: Brill, 1963, vol. I, pp. 181-183; Aḥmad ʿAṭīyyat-Allāh, *al-Qāmūs al-islāmī: mawsū'ah li-al-ta'rīf bi-muṣṭalaḥāt al-fikr al-islāmī wa-ma'ālim al-ḥadārah al-*

Yemenite kings, mentions al-Malik al-Ashraf as a king who came to the throne after the assassination of his father, who ruled Yemen for 47 years. Al-Ashraf's accession did not go smoothly, because his brother, al-Malik al-Mu'ayyad Dā'ūd, was unwilling to submit to his older brother's authority and revolted, attempting to wrest the throne from him. Al-Malik al-Ashraf defeated him in battle and sent him to prison. Abū al-Fidā adds that al-Malik al-Ashraf was 70 years old when he was crowned king of Yemen, and he reigned until his death, 20 months later. After he died, the senior administrators decided to release his brother from prison and crown him king.⁴⁰

ʿUmar b. al-Muẓaffar Yūsuf grew up in the court of his father, who was renowned for his great love of learning and education. The father gave his sons a broad education from the best teachers in the court. As well as *Faqīh* and religious studies, he studied subjects such as the teachings of the Prophet (Hadith), astronomy and astrology, genealogy and the chain of people who passed on the Hadith. Another sphere in which al-Ashraf specialized was the medical profession. His father, al-Malik al-Muẓaffar, once dispatched a request to the Mamluk sultan in Cairo, al-Malik al-Ẓāhir Baybars, to send him one of the court physicians, adding "Let not the honorable and exalted sovereign think that in seeking medicine for ourselves we have no knowledge of medicine. Thanks to Allah we know things in medicine that others do not know, and when we were young we engaged in this profession ... Our son ʿUmar al-Ashraf is also a scholar who is expert in medicine, and has written a book on the subject that is beyond compare."⁴¹ Several other sources also mention that the father of al-Malik al-Ashraf wrote books on medicine⁴² as well as on other subjects such as astrology and divination,⁴³ genealogy (*ʿIlm al-Ansāb*)⁴⁴ and a special treatise on the astrolabe measuring instrument, which the sources emphasize that

islāmīyah wa-tā'rikh al-duwal al-islāmīyah wa-tarājim al-ulamā', Cairo: Maktabat al-Nahḍah al-Miṣriyah, 1966-1970, vol. I, p. 116; al-Ḥabashī, *Maṣādir al-fikr al-ʿarabī al-islāmī fī al-Yaman*, p. 555.

⁴⁰ See Abū al-Fidā, *al-Mukhtaṣar*, vol. IV, pp. 43-44.

⁴¹ ʿAlī b. al-Ḥasan al-Khazraǧī al-Zubaydī (812/1409), *Kitāb al-ʿUqūd al-lu'lu'īyah fī tā'rikh al-dawlah al-rasūlīyah*, ed. Muḥammad Basyūnī ʿAsal, Cairo: Dār al-Hilāl, 1911-1914, vol. I, pp. 277-278.

⁴² *Kitāb Shifā' al-ʿalīl*.

⁴³ "*al-Tabṣīrah fī ʿilm al-nujūm*" and "*Jawāhir al-tijān*," see ʿAṭīyyat-Allāh, *al-Qāmūs al-islāmī*, vol. I, p. 115.

⁴⁴ Al-Malik al-Ashraf ʿUmar b. Yūsuf b. Rasūl, *Kitāb Ṭurfat al-aṣḥāb fī ma'rīfat al-ansāb*, ed. k. w. sterstein, Beirut: Dār Ṣādir, 1992.

he wrote after learning how to use it in practise, and he even became an expert in measuring and calculating with it.⁴⁵

In addition to his writing activities, al-Malik al-Ashraf built a school, which he named al-Ashrafiyah, in the city of Ta'z.⁴⁶ But the characteristic emphasized by all the sources was his great love of horses, and the reputé of the noble racehorses that he bred spread far and wide.⁴⁷

Al-Malik al-Ashraf's veterinary book, '*al-Mughnī fī al-Bayṭarah*', is the most important and relevant to our discussion here. Copies of the manuscript can be found in a number of libraries throughout the world.⁴⁸

2. *Al-Ṣāhib Tāj al-Dīn, Abū 'Abd Allāh Muḥammad b. 'Alī*⁴⁹

In a biography of Tāj al-Dīn written by Ibn Ḥajar al-'Asqalānī, his full name is given as Muḥammad b. Muḥammad b. 'Alī b. Muḥammad b. Salīm b. Ḥannā al-Ṣāhib Tāj al-Dīn Ibn Fakhr al-Dīn Ibn al-Ṣāhib Bahā' al-Dīn al-Maṣrī.⁵⁰ He was born in 640/1242 and died in Egypt in 707/1307. We possess considerable information about him due to his position as a member of the administration in the Mamluk period. His education was entrusted to

⁴⁵ 'Aṭīyyat-Allāh, *al-Qāmūs al-islāmī*, vol. I, p. 115.

⁴⁶ Al-Qalqashandī, *Ṣubḥ al-'a'shā*, vol. V, p. 31.

⁴⁷ The sources mention the names of King al-Ashraf's horses. One of his most beloved horses was named *al-Mawj* (waves). It is described as a yellow horse with a white tail and a white forelock. The story goes that the king would dye the white hair black to make him look like a black and yellow horse, which he considered more attractive. Some other names of his horses were *al-Ra'd* (thunder), *al-Sayyār* (the intrepid walker), *al-Murtāḥ* (the relaxed), *al-Rashtad*, *al-Riḥānī* (sweet-smelling), *al-Misk* (the musky), *al-Ṭawwād* (the one who surmounts hills and mountains), *al-Sabbāḥ* (the swimmer), *al-Qāḍī* (the Cadi). This one was known for his special dark colouring, *Adham*, which was unique in that period. We could also add to this list *al-Mushtahamī*, *al-Riḥānī*, *al-Khalīfah*, *al-Shāhin*, and many more names of horses who achieved fame among all the horse lovers and breeders of the period. See Hilāl Nājī, "Nuṣūṣ min al-mawrūth al-ḥarbī—al-khuyūl al-Yamaniyah fī al-mamlakah al-Rasūliyah," *Majallat al-Mawrid*, IV (1983), pp. 91-222; al-Malik al-Ashraf, *al-Mughnī fī al-bayṭarah*, p. 4 (introduction).

⁴⁸ Al-Malik al-Ashraf, *al-Mughnī fī al-bayṭarah*, *op. cit.*

⁴⁹ For a biography of al-Ṣāhib Tāj al-Dīn's, see Ṣalāḥ al-Dīn Khalīl b. Aybak al-Ṣafadī (764/1362), *al-Wāfi bil-wafayāt*, ed. Riter, Damascus: al-Hāshimīyah, 1959, vol. I, pp. 217-228; Ibn Ḥajar al-'Asqalānī, *al-Durar al-kāminah*, vol. IV, pp. 201-202; Ibn al-Furāt, *Tārīkh Ibn al-Furāt*, vol. VIII, pp. 193, 194, 196 (Beirut, 1939); al-Sakhāwī, *al-Daw' al-lāmī*, vol. XI, p. 244; Ibn Taghrī Birdī, *al-Nujūm*, vol. VIII, pp. 228-229 (Cairo, 1939); al-Ziriklī, *al-A'lām*, vol. VII, p. 261.

⁵⁰ The list of names of this dynasty suggests that it was originally a Christian family. One of the ancestors was named Ḥannā, a typically Christian name. The frequent use of the name Muḥammad also implies that they were converts, because Christians who converted to Islam usually changed their names to Muḥammad. However, the biography does not state this explicitly, so it remains a hypothesis.

a long list of important teachers of religion, including al-Mursī, Ibn ‘Abd al-Dā’im, Ibn Abī al-Yusr, and Sibṭ al-Salafī. After a period during which he studied mainly religious subjects, he started teaching Hadīth, and after the death of Ibn al-Salamūs he was appointed to replace him as a senior minister at the beginning of the Nāṣirī reign.⁵¹ Most of the sources mention him in the context of government and as a powerful figure. For example, he was appointed to an important ministerial position in the month of Ṣafar 693 (January 1294), at the beginning of the Nāṣirī period (the first reign of al-Nāṣir Muḥammad b. Qalāwūn) in Cairo. He is also described as a great scholar who reached a senior position under the Mamluk government by virtue of his education.⁵²

In terms of personal and physical characteristics, al-Ṣāḥib Tāj al-Dīn is described as a benevolent man who gave generously of his wealth, which led many poets to knock on his door and even to dedicate songs of praise to him, like the poets al-Shihāb Maḥmūd, al-Sarrāj al-Warrāq Ibn Dānyāl and others.⁵³ The various chronicles speak of his death as the great loss of a dignitary who bore the title ‘President of Egypt.’ This title is certainly exceptional and testifies to his prestige among the ruling classes. He is also described as a man of honor, handsome, honest, a poet, wealthy, and in short, “a perfect person.”⁵⁴

Al-Ṣāḥib Tāj al-Dīn wrote books on many subjects, including poetry, which was collected in his book *Dīwān*. As befits a senior minister in the Mamluk government, he also took care to perpetuate his name in several buildings, such as the special school that was devoted to the education of children, ‘*Kuttāb*’ which he established in the Qarāfah area (the old cemetery) and a *Ribāṭ*, a fortified structure of the kind that was usually built along trade routes and pilgrim routes—built on the Ṣa’īd road in Egypt, which was also the pilgrim route to Mecca. The building of a *Ribāṭ* by the chief vizier of Egypt was not exceptional in the Mamluk period; we know of many emirs and viziers who perpetuated their names in building projects, especially mosques and schools. However, al-Ṣāḥib’s decision to build a

⁵¹ Ibn Ḥajar al-‘Asqalānī, *al-Durar al-kāminah*, vol. IV, p. 201.

⁵² Al-Ṣafadī, *al-Wāfi*, vol. I, pp. 217–228; Ibn Ḥajar al-‘Asqalānī, *al-Durar al-kāminah*, vol. IV, pp. 201–202; Ibn al-Furāt, *Tārīkh ibn al-Furāt*, vol. VIII, pp. 193, 194, 196; Sakhāwī, *al-Ḍaw’ al-lāmī*, vol. XI, p. 244; Ibn Taghrī Birdī, *al-Nujūm*, vol. VIII, pp. 228–229 (Cairo, 1939); al-Ziriklī, *al-A’lām*, vol. VII, p. 261; Ibn al-‘Amīd, *Shadharāt al-dhahab*, vol. III, pp. 14, 284.

⁵³ See Ibn Ḥajar al-‘Asqalānī, *al-Durar al-kāminah*, vol. IV, pp. 201–202.

⁵⁴ “وكان محتشبا، وسببا، عادلا، شاعرا، ممتولا من الرجال والكمال” See Muḥammad b. Aḥmad al-Dhahabī, *Kitāb al-Ibar fī akhbar man ghabar*, ed. Ṣalāḥ al-Dīn al-Munjid, Kuwait: Dā’irat al-Maṭbū’āt lil-Nashr, 1960–1966, vol. VI, p. 38.

Ribāṭ, whose use was mainly military, perhaps indicates the inclinations of a warrior and horseman who engaged in *furūsīyah*, which is also connected with his veterinary treatise on horses.⁵⁵

Al-Ṣāhib's wealth enabled him to invest in the study and collection of manuscripts of various treatises. For example, he purchased the treatise *al-Āthār al-nabawīyah* for 60,000 dirhams, a huge sum at that time. According to the sources, he bought it because of his great appreciation of books and learning, and for this reason he established a special library in his name, where he displayed all the books he had purchased, especially volumes of Hadith. He endowed a fruit grove with many fruit trees, known as al-Ma'shūq, as well as some other endowments, to cover the library expenses and its maintenance for many years. Another mosque that he built in the region was dār al-Ṭīn.

Al-Ṣāhib's biography highlights his great interest in horses, horseback riding and *furūsīyah*: "He was a horseman who engaged in *furūsīyah*, the art of riding and fighting on horseback, liked to go hunting with birds of prey and hunting animals, and also to take part in battles and incursions."⁵⁶ His occupation with hunting and equestrianism also found expression in his veterinary book. His expertise included knowledge of types of weapons, which he considered essential for everyone going into battle, whether a horseman or a foot soldier. He refers to the range of combat styles, including the use of military tactics contrived to ensure victory. Although he is mostly concerned with the rider who fights or hunts on horseback, he stresses the importance of paying attention to the good health and proper condition of the horse. He claims that the information presented in his book is based on personal knowledge accumulated during his lifetime, granted to him by God. This knowledge encompasses discernment and expertise in the tools of *furūsīyah*. He states that he is gifted with the ability to discern precisely people's true intentions regarding holy war against the enemies of Allah and the opponents of truth and justice, and those who have strayed

⁵⁵ Ibn Baṭṭūṭah praises the *ribāṭ* building for some objects of the Prophet Muḥammad that the vizier acquired and displayed in it. Among these he mentions a chip from the Prophet's food bowl, his kohl equipment, an instrument for weaving his shoes, and even the Koran of the first Caliph, 'Alī b. Abī Ṭālib, that he copied with his own hands. Ibn Baṭṭūṭah notes that al-Ṣāhib Ṭājj al-Dīn acquired these objects in order to enhance the status and prestige of the building and even turn it into a place of pilgrimage for believers from all over the Muslim world. He estimates the price of these objects at 100,000 dirhams, which indicates the great wealth of the builder. In addition, Ṭājj al-Dīn took care to transfer money regularly for food and drink for all who visited there, beyond the regular salaries paid to those who served in the place and the inspectors. See Ibn Baṭṭūṭah, *Rihlat*, vol. I, p. 63.

⁵⁶ Ibn Ḥajar al-'Asqalānī, *al-Durar al-kāminah*, vol. IV, p. 201.

from the path of religion and stopped fulfilling their religious duties. He adds: "The trials that I have undergone and the rich experience that I have accumulated helped me to write a book of this kind, which contains everything needed by people going on Jihad for Allah with pure intentions of truth and justice. This knowledge belongs to the science of *furūsīyah*, and it also includes everything required for foot soldiers, knowledge of animals and their condition, and the use of weapons."⁵⁷ He adds an explanation on how to begin learning the practise of *furūsīyah*, along with a description of the weapons needed for fighting holy wars. He declares that his intention in writing this book was not to show that he was better than others or to boast of his knowledge, and certainly not to find favor with those in power.⁵⁸ He repeats these statements many times, emphasizing the subject of Jihad and *furūsīyah* and citing various sources, some of them religious, that he appears to know well, such as verses from the Koran, to which he adds interpretation that supports the subject in question.⁵⁹

The breadth of al-Ṣāhib Tāj al-Dīn's knowledge is expressed in the many quotations, particularly in the first part of the book, including sayings attributed to famous people from the early days of Islam. *Jāhili* Arabic poetry also occupies an important place in the first chapters. He states that he included in the book the knowledge both of Arabs and of non-Arabs ('*Ajam*), in addition to material based on his personal experience in the field. He mentions that the book includes illustrations that he drew himself in order to demonstrate the subject discussed in the text and serve as guidance for the reader.⁶⁰

Sometimes, al-Ṣāhib's relates critically to subjects that he cites from other sources. Thus, information that he quotes from Ḥannah al-Hindī, is accompanied by the Arabic word *z'ama* (he claimed), perhaps to emphasize that he considers this information incorrect or unreliable. Occasionally, he writes more directly, "he chose," in order to express his disbelief in the words of al-Hindī and portray him as someone whom he does not rely on. Nevertheless he quotes al-Hindī, explaining that he is obligated to cite him verbatim and also to incorporate in his treatise different types of information that exist in the literature, including things passed down orally by the ancients (*al-Awā'il*).⁶¹ Despite al-Ṣāhib's skepticism concerning al-

⁵⁷ Al-Ṣāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, pp. 22-23.

⁵⁸ *Ibid.*

⁵⁹ *Ibid.*, pp. 25-55.

⁶⁰ *Ibid.*, p. 70.

⁶¹ *Ibid.*, p. 136.

Hindī's reliability, the book contains a great deal of material from the Indian tradition that he does consider reliable, and which had been absorbed into the Muslim tradition and became an integral part of it.

The author's attraction to *furūsīyah* and his personal knowledge of the subject did not prevent him from writing about other subjects. It appears that his primary aim of writing about Jihad and *furūsīyah* expanded in the course of time and led him to continue and write a second volume of his treatise, in which he incorporated specifically veterinary subjects. His first volume is basically theoretical: about types of horses, their characteristics, descriptions of defects and illnesses they might incur, the types of food most suitable for them or for their need to lose weight in preparation for a race, methods of training, and so forth. Other draught animals, particularly mules and donkeys, are discussed in this part of the book. The second volume, on the other hand, includes only distinctly veterinary material related to the treatment of diseases of horses and other draught animals. Apparently, the second volume is an outcome of his broad general education and his study of various sources that he discovered through his love of collecting books.

While the author states explicitly in the first volume that his treatise on *furūsīyah* is based on his personal experience and on the trials he underwent as a fighter and a rider, in the second volume he remarks that the content is drawn from various treatises and manuscripts. He emphasizes that in this part of the book he is only copying the words of others and asks the reader not to attribute the material to him,⁶² but rather to the original authors, especially those who declared to have been professional veterinarians. This statement shows al-Šāḥib's sincere intention not to claim for himself any practical veterinary knowledge, a qualification rarely encountered in the Mamluk veterinary literature. It also befits his status as a vizier and a scholar, and is supported by his detailed explanation of the salient difference between a scholar, or what he calls a 'theoretician' in medicine, and someone who engages in medical practise.⁶³ Al-Šāḥib Tāj al-Dīn places himself in the group of theoreticians, whom he considers to be of higher than that of the practitioners.⁶⁴ The author compares those who practise medicine using analogy and those who rely solely on experience, saying:

We saw that the people of education and science among the Byzantine philosophers (al-Rūm) and their sages said things about the characteristics of horses and animals, about their illnesses and the ways of treating them.

⁶² *Ibid.*, vol. II, p. 3.

⁶³ *Ibid.*

⁶⁴ *Ibid.*

With these things 'the people with common sense' of all the nations agreed, while the empiricists could not do the same. Those among the people of India and Persia who were unable to understand analogy were not capable of incorporating into their body of knowledge things that they could not prove empirically. The proponent of analogy is able to incorporate within his body of knowledge things that can be proven by experiment—natural knowledge. This proves that among the groups of doctors, some belonged to the scholastic group who used to hold discussions on opposing ideas, and they surpassed all the others, who belonged to the empirical group. It may be that the scientist who uses analogy does not succeed in a certain treatment in which he chose a certain medicine; this failure is what compels him to move to another type of treatment and choose a different method that may be more effective. In this way he uses something that has not previously been tried for the purpose of finding a solution to the problem through analogy. On the other hand, the empiricist, as soon as he learns and understands a certain method of treatment, stops seeking another method. If he loses something that he has already successfully tried, he is not capable of trying something else due to his fear of trying a new method that he is not sure of. This is the reason why Hippocrates' students of medicine were those who surpassed the empiricists in treating the body.⁶⁵

Further on in his discussion on the differences between the two approaches in medicine, al-Şāhib Tāj al-Dīn also addresses the differences in the matter of diagnosis and classification of animal diseases. The students of Hippocrates determined that there were, in fact, only two types of animal diseases, despite their large number and variety. The first type consists of illnesses that affect one organ of the body, or a certain part of the body (local), while the second type includes diseases that affect the entire body (systemic). In the first category they count diseases of the eye or the hoof, and in the second category there is fever that affects the whole body. Continuing his theoretical explanation, al-Şāhib distinguishes between illnesses that can be diagnosed by external signs and those that are not externally visible, emphasizing that it is essential to seek the causes of the disease. At the end of his introduction to the second volume, he summarizes the topic of treatment of animal diseases, noting that the most important thing is to give the animals the correct nourishment and proper care and treat them with patience and gentleness. Above all one should not display rashness or ignorance during any treatment of animals.⁶⁶

An examination of the manuscript reveals that while in the first volume, dedicated to *furūsiyah*, the author added many marginal notes which

⁶⁵ *Ibid.*, pp. 3-4.

⁶⁶ *Ibid.*, pp. 3-6.

constitute addenda and clarifications of the material in the body of the text, there are no marginal notes in the second volume. The marginal notes in the first volume are written in a range of geometric shapes, and they include much information drawn from other treatises, which he presumably discovered after finishing the book and wanted to update it with all the relevant material. The second part, which deals mainly with medical practise, apparently interested him less, and, as he declares in his introduction, he copied from books and manuscripts that he had at his disposal without presuming to understand the practical material.

3. *Al-Malik al-Mujāhid, 'Alī b. Dā'ūd b. Yūsuf b. 'Umar al-Rasūlī (Ruled 721-764/1321-1362)*

Like al-Malik al-Ashraf, who was described earlier, this king belonged to the Rasūlīd dynasty that reigned in Yemen. He ascended the throne after the death of his father, al-Malik al-Mu'ayyad Dā'ūd (ruled 696-721/1296-1321). Al-Malik al-Mujāhid's period saw many upheavals and was considered one of the more turbulent periods of the Rasūlīd dynasty. Wars were waged between members of the family, some of whom rebelled against this king and tried to oust him from the throne. In the end, he managed to suppress most of the revolts and hold on to the throne for over 40 years. This was attributed to his wisdom, his skill in using the stratagems of power, and his proficiency in managing the state and choosing the people most suited to help him retain his position. On more than one occasion he found himself in a situation where his end was imminent, but he managed to extricate himself at the last minute. From the day he acceded to the throne, many emirs who had been faithful to his uncle, al-Malik al-Manṣūr Ayyūb, began to conspire against him, and even succeeded in capturing him in a battle and handing the reins of power to al-Malik al-Manṣūr. The latter ruled Yemen for three months until al-Malik al-Mujāhid managed to escape from his imprisonment with the help of trusted friends, surprise al-Malik al-Manṣūr in his castle, and take him prisoner. In the year 723/1323 there was another attempted revolt against the king, which was suppressed quickly.⁶⁷

Many events that are described in the sources indicate the upheavals and lack of stability during his reign, added to his strained relations with the Mamluk sultan in Egypt, who tried unceasingly to intervene in events

⁶⁷ On the personality of al-Malik al-Mujāhid we can learn from one of the chronicles of the Rasūlīd dynasty in the Yemen, in which the author describes in detail his cruelty to his family and his persecution of them. See al-Khazraji, *al-'Uqūd al-lu'lu'iyah*, vol. II, pp. 1-128.

in the Rasūlī kingdom, to appoint rulers loyal to him, and even to send an army there in 725/1324. Al-Malik al-Mujāhid's troubles did not end with the withdrawal of the Mamluk armies.⁶⁸ His biography that appears in the chronicle of al-Khazrajī relates that in the year 741/1340 he attacked the al-Ma'āzibah tribe, claiming that they had caused great damage to the cultivated lands of the kingdom. After capturing many members of the tribe, he had some of them put to death while others who were taken captive became playthings for elephants: "the elephant played with them"⁶⁹ It is not clear from this phrase what exactly the game was that the king amused himself with and how the elephant played with them, but it is clear from the general context that it was a cruel game during which the prisoners were killed.⁷⁰

Another incident that shows the instability of his reign due to the tension that prevailed between him and the Mamluk government occurred in 751/1350, when al-Malik al-Mujāhid set out on a pilgrimage to Mecca for the second time in his life. During one of the religious ceremonies related to the Hajj, he was caught by the Mamluk emir who headed the Egyptian sultan's procession. The cause of his arrest this time was a plot by his rivals, who reported that he was planning to seize control of Mecca and appoint a governor on his behalf to replace the one who was subordinate to the Mamluk sultan, and thus incorporate the Hejaz region under his control. He was also accused of insulting the Mamluks by removing the cover (*Kiswah*) of the Ka'bah which was customarily a gold-embroidered black cloth woven in Egypt, and replacing it with a covering woven in Yemen. This act was considered a grave offense to the Mamluk government in Mecca. Therefore, he was arrested and taken in captivity to Egypt. However, he was released from prison after a year, and returned to rule Yemen. When he returned to the throne, at his mother's advice he released some of the imprisoned emirs who were his greatest rivals. Apparently this act improved his status, although we read that the revolts against him continued throughout all the years of his reign. And if this was not enough, Yemen was beset by natural disasters throughout his entire reign. For example, in 760/1358, a plague struck most of his soldiers and killed nearly all of his warhorses

⁶⁸ The Mamluk army, numbering 1,000 mounted soldiers and 22,000 camels bearing food. See *Ibid.*, p. 32.

⁶⁹ Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 33; al-Khazrajī, *al-'Uqūd al-lu'lu'iyah*, vol. II, p. 69.

⁷⁰ He also appointed a woman to rule over this tribe in order to humiliate them, since being ruled by a woman indicated their inferiority to all the Arab tribes in Yemen and beyond. See al-Khazrajī, *al-'Uqūd al-lu'lu'iyah*, vol. II, p. 69.

as well as many other animals. In 764/1362, his son, al-Malik al-Muẓaffar, also attempted to overthrow him after gaining control of the royal stables and stealing all the animals. He advanced towards Aden, the seat of his father, intending to depose him, but his father's guards suspected a plot and prevented him from entering the city. The king summoned his loyal soldiers, but they failed to capture his son. In that same year, al-Malik al-Mujāhid died in the city of Aden after naming his son, al-Malik al-Afḍal, heir to the throne.⁷¹

Although this king's reign is generally described as one torn by revolts and endless wars, this did not prevent him from acting in the spheres of culture and building, and his projects in the latter are remarkable. He built schools, mosques, palaces, and even established a new city, Tha'abāt, which he encircled with a wall. In 740/1339, he established a school in Mecca, naming it after himself (*al-Mujāhidīyah*), and arranged for a permanent *Waqf*—to ensure income for the running costs of its maintenance. In the town of Ta'az he built another school, a mosque, *khānqāh*, and some schools and institutions for the education and upbringing of orphans.⁷²

Al-Malik al-Mujāhid owed his broad education to his father, al-Malik al-Mu'ayyad, a learned man and eminent scholar, who liked to collect a great many scholars and intellectuals in his court.⁷³ Like his father, al-Malik al-Mujāhid was very generous towards the scholars and intellectuals who knocked on his door, but his great love was for horses, *furūsīyah* and hunting, as we learn from his book, "*Al-Aqwāl al-kāfiyah wa-al-fuṣūl al-shāfiyah*," which is the focus of our interest here.⁷⁴

In his introduction to this book, al-Malik al-Mujāhid notes that his motive for writing it is the braggadocio of many of his contemporaries who deal with the care of horses. According to him, these braggarts want to convince the simple people that they have reached the summit of their studies and education in this field, but when they are put to the test and asked about any sign on the horse's body, about the state of its health,

⁷¹ *Ibid.*, pp. 121-124.

⁷² *Ibid.*, pp. 125-126.

⁷³ We know that his father had studied under the greatest scholars of his time. He was a man of broad horizons who, in addition to the 'regular' education of religion and study of religious sources, the Hadith and the Koran, had also studied poetry and literature. His treatise, entitled *Mukhtaṣar kitāb al-bayzarah*—A Short Essay on Falconry, attests to his love of hunting. He also wrote a treatise in which he interpreted the hunting song of Abū Firās al-Ḥamadānī (d. 358/968). In addition, he researched the history of the Arabs and was knowledgeable on the various genealogies of Arab tribes.

⁷⁴ Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*; For a late copy (990/1582) of this work, see B.N., *Ms Arabe* 2820, fol. 97v°.

or about one of its concealed characteristics, they cannot answer. He adds that when these veterinarians are asked to solve some problem with the horse's behaviour, to re-educate it or train a young colt for riding, they are helpless. Yet worse, he writes, they are liable to cause damage to healthy horses.⁷⁵ He states that his reason for writing the treatise is the deterioration of the veterinary profession due to the inadequacy of the people engaged in the care and training of horses.

Another important motive for writing the book was his great love of horses; as he declared "his heart was full of love and admiration for horses." For this reason, he bought horses from all over Yemen and the Arabian Peninsula. He describes himself as a man with vast experience in many aspects related to horses, such as testing their temperament, recognizing their nature and their inborn characteristics, choosing thoroughbred horses, and, of course, excellent equestrian skills. He spent many hours with his horses and even served them food and water with his own hands. Furthermore, he states that on journeys or in the stables he is busy day and night training and educating his horses, examining them, checking the accessories, the saddle, the stirrups, the bridle, the straps and the reins, and making sure they are all comfortably attached. He relates that his interest in horses began at an early age, and as he grew older he loved them more and more, and every day he would ask himself if it was not time to stop, but his soul asked for more.⁷⁶

In his book he gathered the knowledge he had accumulated all his life in addition to the material drawn from other sources.⁷⁷ Yet he writes that after studying and reading many books on the subject, he came to the conclusion that most of these authors tended to attribute the material presented in their books to others whom they simply cited, without any input from their own knowledge or proven experience. Like Abū Bakr, al-Ṣāhib Tāj al-Dīn, and other writers of veterinary material from the Mamluk period, Al-Malik al-Mujāhid expresses a note of scorn, even dismissal, of knowledge coming from the classical tradition. For example, he quotes a saying from 'the Romans', which were usually Byzantine sources, concerning the times that were considered optimal for impregnating mares, and ridicules the idea that the direction of the winds blowing during impregnation will determine the sex of the foal. According to this idea, if there is a north wind during

⁷⁵ Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, pp. 87-88.

⁷⁶ *Ibid.*, p. 86.

⁷⁷ He mentions two occupations that deal with horse taming and training, but the unclear phrasing makes it hard to understand the differences between them.

conception the foal will be a male, while a south wind will lead to the birth of a female. Similarly, he cites 'the Romans' as saying that the best times for impregnation are the months of January, February, March and April. He writes that he found nothing of this nature in the writing of the Arabs, who were more knowledgeable concerning horses,⁷⁸ and adds that very few of the early authors had practical veterinary experience and most of them had copied from sources that preceded them. He emphasizes that his criticism of the early writers does not reflect contempt for them nor arrogance, because no-one is capable of knowing everything about horses.⁷⁹

Not only veterinary sources served al-Malik al-Mujāhid in writing this book, but also books of philology, poetry, *Adab* and Hadith. One can identify entire passages taken from 9th and 10th century authors, such as al-Aṣmaʿī and Abū 'Ubaydah.⁸⁰ The poems and the many linguistic explanations form a major part of this book.

Al-Malik al-Mujāhid's book is divided into six chapters. In the first chapter he discusses the virtues of horses, as described in the Koran, the Hadith, and in Arab traditions from the *Jāhiliyyah* period and early Islam. In the second chapter he lists the names of horses that were important in Arab history, describing their colours, their physical appearance, various marks on their body and the signs that help in choosing the best horses. The third chapter, among other things, discusses aspects connected with horse breeding, including zoological knowledge related to pregnancy and birth, methods of training for riding, forms of riding, and details concerning the condition and number of their teeth. The fourth chapter discusses illnesses, listing the names of diseases that affect horses, their causes, and methods of treating them. This chapter also mentions the plague that occurred in Yemen in 727/1326, striking many horses and killing most of them. The fifth chapter lists the horses that belonged to the Prophet Muḥammad, the names of famous horses from the *Jāhiliyyah* and from the early Islamic period. In this chapter the writer also refers to horses that were raised in the Rasūlid court, those that belonged to his ancestors and mainly those that belonged to him. Although the major focus of the book is in Yemen, it sometimes mentions topics concerning horses from other places and

⁷⁸ Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 189.

⁷⁹ In support of his arguments on this issue, the author mentions the already cited story of al-Aṣmaʿī and Abū 'Ubaydah, who were tested on their knowledge of the contents of their books about horses. See *ibid.*, p. 87.

⁸⁰ The passages in the book that are attributed to these two authors do not appear in the manuscripts that are extant today. Perhaps the author obtained manuscripts that were more complete, or versions different from those known today.

also refers to the knowledge of the Indians and Persians on the care and training of horses and other animals. The sixth chapter deals with other draught animals, such as mules, donkeys, camels, and even elephants, discussing each of them and describing the role they fill as well as their physical appearance and some of the medical treatments appropriate for each of them.

Al-Malik al-Mujāhid's broad education is manifested in the book mainly in the lexical-philological domain, and he quotes extensively from important works in the field of language, *Adab* and grammar as well as various lexical treatises. Among these works we can mention the book by al-Jawharī, on which he relied a great deal because it was a Yemenite source.⁸¹ From early treatises on horses he cites Abū 'Ubaydah frequently, and generally tends to accept his opinion in cases where there are different interpretations. He often quotes from al-Aṣma'ī's book on horses and also from the work of Ibn Qutaybah. Chronicles also served him as a source of information and he quotes, for example, from the chronicle of Ibn al-Athīr.⁸² In discussing the names of the horse's body parts, he cites many lexical sources and explains in detail how to pronounce each word. After quoting a poem that he relies on with regard to the name of a certain organ or part of it, he sometimes explains the grammatical relationship of the word while analyzing the poem, thus expanding and adding evidence from grammar books, from the Koran and from various philological treatises.⁸³ This approach of expanding the boundaries of the discipline seems to me to be unique to this author, especially the emphasis on correct pronunciation. He says in his introduction that it is important to him to explain words and names describing patches or marks on the horse's body according to the interpretation of linguists, because this will save the reader having to search in other books, and in particular it guarantees that the reader will not make mistakes in the correct pronunciation of the terms.⁸⁴

Compared to previous authors of veterinary treatises who used various

⁸¹ See, for example al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, pp. 120, 121.

⁸² *Ibid.*, p. 280.

⁸³ See, for example, his treatment of the word '*al-Qawnas*' which is the name of the protruding bone in the horse's head in the line joining the two ears. To support his argument, he cites a poem by a *Jāhili* poet, explains the word and its pronunciation, goes into the area of grammar and also quotes a verse from the Koran. He does the same thing with the names of many of the horse's body parts. *Ibid.*, pp. 142-145.

⁸⁴ "وفسرنا ما جاء عن العرب من اللغة في أسماء الدوائر، ودللنا على مواضعه من الأعضاء، وكفينا الناظر في كتابنا مؤونة السؤال عما يعزب عن معرفته، ويأمن فيه التصحيف، وانما رغبت من رغب عن النظر في كتب المصنفين في هذا الفن من الاوائل المحققين لعدم بيان الغرض المستفيد" see *Ibid.*, pp. 141-142.

earlier materials on this topic, this work is much richer in details. For example, the author gathered much more original material describing horses' external body parts than earlier authors, such as Abū 'Ubaydah, al-Aṣma'ī, Ibn Sīdah, Ibn Hudhayl al-Andalusī. Another example is his description of pregnancy in the mare and stages in the development of the foetus. Ibn Sīdah's lexicon, for example, gives only six names for the foetus, based on the stages of its development.⁸⁵ Al-Aṣma'ī describes nine stages, each with a different name for the foetus.⁸⁶ Abū 'Ubaydah surpasses both of these and uses 13 different expressions to describe the age of the foetus at various stages of development.⁸⁷ Al-Malik al-Mujāhid counts 22 different terms, each indicating a different condition and age of the foetus.⁸⁸ Apparently this was the result of his broad linguistic education, and of the fact that he had been granted the opportunity of studying many varied sources, including late ones, such as al-Jawharī whom he quotes.⁸⁹

An interesting aspect of this treatise concerns issues that are unique to the geographical region of Yemen. For example, he mentions names of medicines, ointments, medicinal preparations, as well as medicinal herbs.⁹⁰ It is not surprising to discover that he was the only author of veterinary literature who chose to write about the plague that struck the horses and mules in Yemen in 728/1327.⁹¹ The special chapter devoted to a description of the famous horses of the Rasūlid kingdom consists largely of a list of names and descriptions of the horses in the stables of the Rasūlid kings, including details of their pedigree, and it also includes verses of his poetry lamenting the loss of two of his beloved horses. He even mentions that he gave orders to bury them in a special grave and erect tombstones engraved with these verses.⁹²

This treatise is almost the only veterinary book of this period that deals

⁸⁵ "مقص، عقوق، ملبع، قارح، مريض، مملص" Ibn Sīdah, *al-Mukhaṣṣaṣ*, vol. VI, p. 136.

⁸⁶ "فريش، السلوب، وديق، مقص، ملبع، مريض، معق، متوجة، تتوج" see al-Aṣma'ī, *Kitāb al-Khayl*, pp. 185-186.

⁸⁷ "الدمعوص، العلقه، الدودة، السليل، القارح، مشعر، عقوق، ملبع، مريض، مقرب، فارق، خذول" see Abū 'Ubaydah, *Kitāb al-Khayl*, p. 40.

⁸⁸ "مقص، ملبع، مرتج، علقه، الدودة، السليل، عقوق، مشرق، مريض، مضرع، مقرب، مريح، ميم، فارق" "أزلقت، أزلقت، أخذجت، أخذجت، مجر، متيج، خذجت، أخذجت، أخذجت، أخذجت" see al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, pp. 187-188.

⁸⁹ *Ibid.*

⁹⁰ One example is the use of the faeces or bodily secretions of an animal known in Yemen as *Abū 'Uraydān*, for the treatment of eye diseases. See *Ibid.*, p. 255.

⁹¹ *Ibid.*, p. 275.

⁹² *Ibid.*, pp. 350-351.

with camels and elephants. In the chapter on camels he describes the various breeds and their distribution in the different regions of Yemen. He discusses the differences between all the types that generally belong to a certain geographical region, both in Yemen and elsewhere, and tells of camels that were born as a result of cross-breeding. In this context he discusses the medical treatment of camels and enumerates the diseases to which they are susceptible and the customary methods of treatment in Yemen. The chapter on elephants is among the more original in the book, although the veterinary content is meager.

Apparently the author wrote this book ten years after acceding to the throne (in 721/1321), because he writes of the plague that attacked the horses and mules in 728/1327. In the last section of chapter four, under the heading "recalling a disease that occurred in Yemen in the year 728/1327,"⁹³ he gives a precise description of the signs of the plague, especially the speed with which horses died one after the other. He writes that he found no mention of this illness and its treatment in any veterinary book. The author describes the process of infection, saying that when a horse infected by the disease is about to eat, a greenish fluid like bile starts to drip from his nostrils, his head droops and he cannot raise it, and within a short time he falls lifeless to the ground. According to the writer, the plague broke out in the Hadramaut region, and from there it spread throughout Yemen and even reached Mecca. The number of horses that died in this plague was enormous, and mules were also affected, though in smaller numbers. The worst hit were the thoroughbred horses, especially in the Aden area. He writes that the plague spread so quickly and so fatally that when two people in the market were arguing over the price of a horse, the horse dropped dead before they finished the argument.

The same treatise adds some interesting information on the spread of the plague to India. The Indians bought their horses in Yemen for a high price but these died a short time after reaching their Indian destination. When cases of infection and death increased, the Indians decided to conduct a special examination before purchasing a horse. This examination, which was not known in Yemen, involved turning the inside of the horse's eyelids upwards. If they discerned a yellowish colour on the inner side of the eyelids, they considered it to be the first sign of the disease, and cancelled the deal. This test proved reliable in identifying the early symptoms of the disease. This information implies advanced veterinary knowledge

⁹³ The heading of the fourth chapter mentions the year 727 H (1326) as the date when the plague struck the horses in Yemen, whereas the heading of the last section of the chapter gives the year as 728 H/1327. See *Ibid.*, p. 275.

in India and is surprising, because these horses were brought there and purchased from Yemen. It is even more surprising in view of the fact that most of the veterinary treatises on horses praise the Arabs' comprehensive knowledge and their well-known expertise in treating horses. In the case of this disease, the Indians were those who determined the method of diagnosis, presumably also used for diagnosing diseases in other animals. It should be noted here that the Indian tradition, which was so highly developed in the sciences and medicine, including veterinary medicine, receives very little mention in the research literature compared with the emphasis on the classical tradition.⁹⁴

4. *Ibn Mankalī—A Mamluk in the Sultan's Service*

Muḥammad Ibn Mankalī (Manklī, Manglī or Mangalī) was a fourteenth-century mounted warrior, a hunter and an army officer who was adept in the equestrian arts. Contemporary sources barely mention this writer, and we learn about him mainly from his books, from which it appears that he was a Mamluk who served several sultans, especially al-Malik al-Zāhir and al-Malik Sha'bān. He died in old age in the year 784/1382.⁹⁵ He was proficient in methods of warfare, and reached a high rank in the Mamluk military hierarchy. He belonged to the group of Mamluk warriors known as *Jund al-ḥalqah*, who served the sultan directly and were not replaced with the change of rulers. These soldiers were generally loyal to the sultan and were not transferred to any other position in the service of other Mamluk emirs.⁹⁶ In the year 765/1363 Ibn Mankalī was appointed *Naqīb al-Jaysh* in

⁹⁴ Ullmann, *Die Medizin im Islam*, pp. 103-107.

⁹⁵ Two studies have been written about Ibn Mankalī, one an article in Arabic dealing mainly with the art of maritime warfare among the Muslims according to Ibn Mankalī's writings, and the other in German about Ibn Mankalī himself. See Sa'id 'Āshūr, "Fann al-qitāl al-baḥrī 'ind al-muslimīn fī ḍaw' kitābāt Muḥammad Ibn Mankalī," *Majallat kulliyat al-ādāb wa-al-tarbiyah*, XII (July 1977/Jamādī al-Akhirah 1397 H), pp. 35-46; Gerhard Zoppoth, Muḥammad Ibn Māngli, Ein ägyptischer Offizier und Schriftsteller des 14. Jahrhunderts," *Wiener Zeitschrift für die Kunde des Morgenlandes*, 53 (1957), pp. 288-299.

⁹⁶ The chronicler Ibn Taghrī Birdī mentions soldiers from this group in the company of distinguished Mamluk emirs who appeared before the sultan at official celebrations. One of the duties of a Mamluk soldier belonging to "*al-ḥalaqah*" was to escort Mamluk emirs who were invited to meet the sultan. This duty entailed considerable danger, because it sometimes involved bringing a senior emir to the sultan to stand trial or to be executed. They also escorted those who were dismissed from their position and sentenced to exile in some other region. Another task of these soldiers was to present the official processions to the sultan during various festivities. Al-Qalqashandī speaks of the salary that these soldiers received; the officers received 1500 dinars, while the common soldiers received only 250

Alexandria, under the authority of the emir Ṣalāḥ al-Dīn Khalīl b. ‘Arrām.⁹⁷

Ibn Mankalī’s eleven books reveal that he was a great expert on warfare and the tools of war developed by the Mamluks. They deal mainly with the methods and stratagems practised in warfare and the various weapons used during that period. In one treatise, dedicated to the sultan al-Malik al-Ashraf Sha‘bān (764-778), Ibn Mankalī discusses methods of maritime warfare.⁹⁸

In his treatise on hunting, entitled “*Uns al-malā bi-waḥsh al-falā*” (Merrymaking among wild animals of the desert), the most relevant for our purposes, Ibn Mankalī used a large variety of ancient sources, among them early *Adab* books, which he sometimes mentions by name,⁹⁹ and *Adab* books from his own period.¹⁰⁰ In the veterinary sphere, he relies mostly on the work of the thirteenth-century al-Asadī (d. 611/1262), whom he especially admires and calls him *al-ustādh*.¹⁰¹

Ibn Mankalī’s originality, as manifested in his hunting book, is not related to the medical contents but to other spheres such as the rules of the hunt, methods of hunting, styles of horseback riding, the accessories necessary

dinars. See al-Qalqashandī, *Ṣubḥ al-a’shā*, vol. IV, pp. 50-51, al-Maqrīzī, *al-Khiṭaṭ*, vol. III, p. 350.

⁹⁷ Ibn Mankalī, *Uns al-malā*, p. 10.

⁹⁸ The list of Ibn Mankalī’s works includes books on warfare, treatment of soldiers wounded in battle, use of watchtowers in battle, catapults, hunting, *furūsiyah*, codes of behaviour in the presence of the ruler, *munādamah* (Member of the Royal Banquet—*nadīm*), and even one book including material on spirituality or on supernatural attributes of words and letters. Following are the titles of his works 1. *al-Aḥkām al-mamlūkiyah wa-al-dawābiṭ al-nāmūsiyah*; 2. *al-Adillāh al-rasmīyah fi al-ta’ābī al-ḥarbīyah*; 3. *al-Tadbīrāt al-sultāniyah fi siyāsāt al-ṣanā’i’ al-ḥarbīyah*; 4. *Kitāb al-Ḥiyāl wa-al-ḥurūb wa-ḥifẓ al-mudun wa-al-durūb*; 5. *al-Manḥal al-’adhb li-ward ahl al-ḥarb*; 6. *Aqṣā al-amad fi al-radd ‘alā munkasir al-’adad* (lost); 7. *Risālat al-taḥqīq fi sur‘at al-fawīq* (lost); 8. *al-Risālah al-murḍīyah fi ṣinā‘at al-jundīyah*; 9. *Ṭiqd al-sulūk fi-mā yalzam jalīs al-mulūk*; 10. *Kitāb al-Kashf wa-al-bayān*; 11. *Uns al-malā bi-waḥsh al-falā*, see Ḥājī Khalīfah, *Kashf al-Zunūn*, vol. I, p. 50; Ibn Mankalī, *Uns al-malā*, pp. 13-16 (Introduction).

⁹⁹ Among the early writers of *Adab* literature, he cites, for example, al-Jāḥiẓ (225/868), Ibn Qutaybah (276/889), Abū al-Ṣalt b. ‘Abd al-‘Azīz al-Andalusī (528/1133), as well as clerics and religious authorities such as al-Shāfi‘ī, Abū Ḥanīfah and Fakhr al-Dīn al-Rāzī. See Ibn Mankalī, *Uns al-malā*, pp. 58, 65, 67, 95, 236, etc.

¹⁰⁰ For example, in a chapter that describes methods of getting rid of snakes, he chooses to quote from the book of al-Warrāq *Mabāḥij al-fikar wa-manāḥij al-‘ibar*, mentioning the full name of the writer and the title of the book from which he drew the material “قال محمد بن إبراهيم بن يحيى الشهير بالوراق في كتابه مباح الفكر ومانح العبر”. The author of this book, which is considered one of the richest anthologies of *Adab* from the 14th century, was also known as al-Waṭwāt (718/1318). See *Ibid.*, p. 229.

¹⁰¹ Ibn Mankalī states that al-Asadī was an expert on hunting who lived during the Ayyubid period, “in the year five hundred and something.” Another source he uses is the treatise of Ibn Akhī Ḥizām al-Khutlī, whom he also refers to as *al-Ustādh*. See, for example, *Ibid.*, pp. 73, 79, 103, 129, 130, 147, 154, 155, 201, 213, 216, 223, 242, 245, 246.

for horses during battle, types of saddles used, and more.

When he wrote the book Ibn Mankalī was aged about 70, sated with wars and hunting. He is very critical of those younger than him, particularly of their tendency to embrace innovations and inventions in *furūsīyah*. For example, he criticizes “foreigners” (*al-‘ajam*) who introduced a new form of saddle, which was narrow and raised at the back. He enumerates nine good reasons for not using this new saddle, whose raised back might hinder the rider’s possibility of escape and could be a serious drawback during battle.¹⁰² He also criticizes sharply a group of Mamluk soldiers whom he calls “the Turks,” apparently because they belonged to the Mamluk group of Slavic (*ṣaqlabī*) origin, for their reluctance to make efforts and to learn. He also pours out his wrath on the Mamluk horse handlers, who, according to him, receive wages from the sultan for this role and abuse their office. He stresses that it is the duty of everyone who takes care of horses to love them dearly and treat them lovingly and not abandon them to servant-boys (*ghilmān*), who understand nothing of the care of horses and may cause them great damage. He writes that these boys not only fail to take proper care of the horses but even steal their food, thus causing them to become weak and fall ill. Even worse, he adds, after eating meat and fat, the boys wash their hands in the horses’ drinking water, causing them untold injury and rendering them susceptible to horse disease, which causes thirst and dehydration. The writer speaks scathingly of Mamluks who do not show love of horses, which to him is an iron rule in the education of every Mamluk.¹⁰³

It is interesting to find in this book a reference to the Franks in the context of horse riding methods. Ibn Mankalī’s approach to the subject appears to be realistic and reflects his expertise in the subject. Though agreeing with most of the Arab sources that describe them as ‘enemies of Islam’, he praises them for their proficiency in riding and for being even better than the Tartars. In his view, both the Turks and the Tartars are inferior to the Frankish fighters, especially in terms of fighting and horseback riding.¹⁰⁴

Ibn Mankalī also relies a great deal on religious sources, especially in discussing ritual purity and the rules of animal slaughter. Evidently, this was a subject of great importance to the hunting enthusiasts among the Mamluks. A steadfast rule emphasized by Ibn Mankalī is that the hunted

¹⁰² *Ibid.*, pp. 71-72. In the printed edition the opening phrase in this passage refers to seven flaws (probably a result of incorrect reading of the manuscript), but the list of flaws actually includes nine.

¹⁰³ *Ibid.*, p. 97.

¹⁰⁴ *Ibid.*, p. 101.

animals' suffering should be minimized as far as possible. For example, it is the duty of the hunter to take with him two sharp knives, so that if one is broken or damaged before he has finished killing the quarry, he will have another knife to finish the job quickly and spare the animal unnecessary suffering.¹⁰⁵

Although Ibn Mankalī does not expand on all the veterinary aspects, and the medical material in the book is scanty, this is nevertheless an important source for methods of treating horses and contains information that is not found in other Mamluk treatises. In fact, it is the only source from the Mamluk period that is defined by its author as a book on hunting that includes materials on a variety of veterinary topics. Thus, the book includes both hippology, in Arabic *bayṭarah* or *zarṭaqah*, which mainly concerns the care of horses and similar pack animals, and *Bazyarah*—the treatment of hunting animals such as dogs and cheetahs, but mainly falcons, hawks and other birds of prey that are trained for hunting. In addition, a large part of the book is devoted to hunted animals, which is also exceptional in this context. However, Ibn Mankalī does not, in fact, innovate very much in the discussion on hunted animals and he mainly relies on the *Adab* sources devoted to descriptions of animals, such as the book by al-Damīrī, of the Mamluk period (d. 808/1405), who summarized most of the zoological material that was written in Arabic, such as *Kitāb al-Ḥayawān* by al-Jāḥiẓ (255/868), *ʿAjāʾib al-Makhlūqāt* by al-Qazwīnī (682/1283) and even the Arabic version of Aristotle's zoological work—*Kitāb al-Ḥayawān*. Another rich source from which Ibn Mankalī drew material was the book by Kushājīm (d. after 358/968), *al-Maṣāʾid wa-al-Maṭāʾid*.

Several studies that have been conducted on the Mamluk period point to the rise in Sufism under the Mamluk rule in Syria and Egypt, and attribute it to the massive support that this stream received from the rulers.¹⁰⁶ This is not the place to expand on these matters, but it is clear from Ibn Mankalī's words that he was close to the Sufi approach, and this led him to confront

¹⁰⁵ *Ibid.*, pp. 69–70.

¹⁰⁶ From the 12th century onwards the *taṣawwuf* movement (piety and mysticism) was strengthened by the support of many rulers throughout the Muslim world. This support was expressed through help in building centers for worship and permanent residences for those who belonged to various ways (*Ṭarīqah*). The Mamluks are known for their support of the Sufis, especially by building *Zāwiyah*(s), *Ribāt*(s), and other buildings that served as centers of study and permanent places of worship. Among the famous *Ṭarīqah* in Egypt is the al-Aḥmadiyah, named after its founder al-Shaykh Aḥmad al-Badawī, a 14th century Egyptian saint whose tomb is in Ṭanṭā and serves to this day as a place of pilgrimage. On the *Taṣawwuf* movement, see A.J. Arberry, *Sufism: An Account of the Mystics of Islam*, London: George Allen and Unwin, 1950.

the 'logicians' and criticize them harshly.¹⁰⁷ His inclination towards the Sufi ideas is also related to his criticism of al-Asadī, who, as stated, was one of his major sources. In one passage in the book he forgets for a moment the topic he is discussing on hunting birds of the vulture type, and cites a familiar story about these birds, describing how they succeed in trapping wild donkeys. For this purpose, he writes, the vultures use a clever trick: they dive into a lake and, coming out of the water thoroughly soaked, they stretch out on the sand spreading their wings. Then, with the sand stuck to their feathers, they fly upward and attack the wild donkeys, swooping at them and shaking the sand into their eyes. In this way they are able to trap them. In citing this story, Ibn Mankalī remarks that al-Asadī, the author whom he quotes extensively, denies stories of this kind. Ibn Mankalī wonders about al-Asadī's denial, and above all he is surprised that al-Asadī thinks that one should not believe stories that are not the result of observation. This attitude infuriates Ibn Mankalī, who criticizes him severely, claiming that such affirmations which are against the laws of Islam.

Another source worthy of special mention from Ibn Mankalī's period is a book by Muḥammad b. Ibrāhīm b. Yahyā al-Warrāq, known as al-Waṭwāt,¹⁰⁸ who was one of the most important writers of *Adab* literature in that period. His biography by al-'Asqalānī lists his books, and emphasizes in particular the importance of the book cited by Ibn Mankalī, *Mabāhij al-Fikar wa-Manāhij al-'Ibar* (The Joy of Thought and Methods of Inference), a kind of anthology of *Adab* that includes a great deal of material on animals.¹⁰⁹ Ibn Mankalī bases some of the contents of his book on information that he heard from people of his period whose knowledge was derived mainly from their personal experience of hunting. For example, he calls one by the affectionate term *akhī*, my brother, which indicates his close friendship with the man, whose name was Sayf al-Dīn Tumurbughā al-Aḥmadī.¹¹⁰ Ibn Mankalī describes seeing this man in the land of the Tartars, where, he writes, there are bird tamers who specialize in training hunting birds to

¹⁰⁷ Ibn Mankalī, *Uns al-malā*, p. 155.

¹⁰⁸ *Ibid.*, p. 229.

¹⁰⁹ The book is divided into four parts: the first part deals with the creation of the heaven and earth, and the other planets, as well as the days and months; the second part describes the earth and its division into different climates; the third discusses the characteristics of man and the nature of animals; the fourth part, on the world of flora, includes a description of the characteristics of plants and the benefits that can be derived from them. Muḥammad 'Isā Ṣālihiyāh in Ibn Mankalī's book, *Uns al-malā*, pp. 229-230. On Ibn al-Waṭwāt, see Ibn Ḥajar al-'Asqalānī, *al-Durar al-kāminah*, vol. III, p. 298.

¹¹⁰ I was not able to find any information about this man in the relevant sources, but his name indicates that he was a Mamluk.

hunt certain types of animals such as hinds.¹¹¹ Elsewhere in the book, he quotes a man named Ḥamīd al-Bāzyār, who was apparently also one of the falconers who operated in the court of the Mamluk sultan.¹¹²

Some other unusual material in Ibn Mankalī's treatise, which perhaps suits his Sufi leanings and his belief in supernatural occurrences, is connected with the letters of the alphabet. Ibn Mankalī discusses what he calls "the nature of the letters" (*Ṭabā'i' al-Ḥurūf*), that is to say, mystical or healing characteristics of the Arabic letters, which are used to form a kind of supernatural prescription.¹¹³ The letters are written on the abdomen or the inside of the thigh as a preventative against involuntary ejaculation (or masturbation) while on a hunting trip. According to him, the treatment is particularly effective in arid regions and helps to preserve a state of perfect purity. Another subject in the book, also rare in veterinary literature, concerns the most suitable times for going out on a hunt.¹¹⁴ Ibn Mankalī specifies the exact hours of every day of the week that he considers best for hunting: Sunday, 2 o'clock and 6 o'clock (presumably after sunrise); Monday, 7 o'clock and 10 o'clock; Tuesday, 7 o'clock; Wednesday, at sunrise; Thursday, after sunrise; Friday, the first, second, fifth, sixth and eleventh hour after sunrise; Saturday, 4 o'clock and 7 o'clock.¹¹⁵

¹¹¹ He describes the method they used to train falcons to hunt certain animals by putting meat on the animal's eyes, thus stimulating the falcons to chase or hunt only that species of animal. The description is not clear and the method is not explained in detail. See Ibn Mankalī, *Uns al-malā*, p. 213.

¹¹² *Ibid.*, p. 212.

¹¹³ The 'nature of the letters' was a central issue in the Sufi perception, which ascribed supernatural powers to the Arabic letters because they were created by God. According to this perception, the letters contain divine secrets that are revealed only to those who take the path of Sufi. There were some who also attributed characteristics to the letters based on classical Greek theories, with the division following the four humours: fire, air, water and earth. According to this division, each letter belongs to one of these four elements. The basic natural characteristics also influence man's temperament and therefore they affect his recovery from illness. See Ibn Khaldūn, *Shifā' al-sā'il wa-tahdhīb al-musā'il*, ed. Muḥammad Muṭī' al-Ḥāfiẓ, Damascus: Dār al-Fikr, 1996, pp. 112-115; Ibn Mankalī, *Uns al-malā*, p. 252. See also ch. V.

¹¹⁴ *Ibid.*, p. 252.

¹¹⁵ *Ibid.*

C. VETERINARY PRACTITIONERS

1. *Abū Bakr al-Bayṭār—A Veterinarian in the Mamluk Court*¹¹⁶

The third group of people who turned their hand to writing on veterinary subjects were the veterinarians. In contrast to the other two groups—the scholars and the ‘equestrians’ of horses—these were practitioners who engaged in the medical treatment of animals after professional training. It is not surprising to discover that the list of professional veterinarians who also wrote treatises on the subject is not long. In fact, we know of only one such from the Mamluk period. Abū Bakr was chief veterinarian in the stables of Sultan al-Nāṣir Muḥammad b. Qalāwūn.¹¹⁷ Although it is not mentioned anywhere that his book was commissioned by the sultan, it is doubtful whether Abū Bakr would have or could have entered upon such a huge project without the sultan’s patronage. He even gave the book the title ‘*al-Nāṣirī*’ in honor of al-Malik al-Nāṣir b. Qalāwūn. Regarding the question of patronage, some writers present a misleading picture of

¹¹⁶ Abū Bakr’s book has been published in two scientific editions. One, from 1991-1996, edited by Abdel-Rahman al-Daccak [*Sic*]—‘Abd al-Raḥmān al-Daqqāq, served me as a reference base in my research. The other version was published in 1993, edited by ‘Abd al-Raḥmān Ibrīq. See Abū Bakr b. Badr al-Dīn al-Bayṭār, *Kāshif hamm al-wayl fi ma’rifat amrāḍ al-khayl, aw kāmīl al-ṣinā’atayn al-bayṭarah wa-al-zarṭaqah al-ma’rūf bi-al-Nāṣirī*, ed. ‘Abd al-Raḥmān al-Daqqāq, Ishrāf Gérard Troupeau, Beirut: Dār al-Nafā’is, 1991-1996; Abū Bakr al-Bayṭār, *Kāmīl al-ṣinā’atayn fi al-bayṭarah wa-al-zarḍaqah al-ma’rūf bi-al-Nāṣirī*, ed. ‘Abd al-Raḥmān Ibrīq, Aleppo: Ma’had al-Turāth al-‘Ilmī al-‘Arabī, 1413/1993. In addition to the printed version, I also used the following manuscripts of the same treatise: B.N., Ms. *Arabe* 203 (copied 875/1470); B.L., Ms. *ADD. 19,448* (994) (dated 1159/1746); Bodl. L., Ms. *Hunt. 136*.

¹¹⁷ Al-Malik al-Nāṣir Nāṣir al-Dīn Muḥammad ibn Qalāwūn (nicknamed Abū al-Ma’ālī) (1285-1340), was the ninth Mamluk sultan of Egypt who was inaugurated three times, from December 1293 to December 1294, from 1299 to 1309 and from 1309 till his death in 1341. See P.M. Holt, “al- Nāṣir.” *E.I.* 2, vol. VII (1993), pp. 991-993; Donald P. Little, *An introduction to Mamlūk historiography*, Wiesbaden: F. Steiner, 1970; Abū al-Fidā’, *al-Mukhtaṣar*, vol. IV, pp. 30-154; Ibn Aybak al-Dawādārī, *Kanz al-durar wa-jāmi’ al-ghurar*, ed. Ulrich Haarmann, Freiburg im Breisgau: Klaus Schwarz Verlag, 1971, vol. VIII. pp. 352-400; K.V. Zetterstéen, *Beiträge zur Geschichte der Mamlükensultane*, Leiden: Brill, 1919; Šams ad-Dīn aš-Šuḡā’is [cit.], *Ta’rikh al-Malik al-Nāṣir Muḥammad b. Qalāwūn al-Šāliḥi wa-awlādihi* [Beiträge zur mamlukischen Historiographie nach dem Tode al-Malik an-Nāṣirs], ed. Barbara Schäfer, Freiburg im Breisgau: Klaus Schwarz Verlag, 1971; Šalāḥ al-Dīn Khalīl b. Aybak al-Šafādī, *Kitāb al-Wāfi bi al-wafayāt*, ed. Hellmut Ritter, Wiesbaden: F. Steiner, 1961 (numerous relevant biographical notices including al-Nāṣir Muḥammad at vol. IV, pp. 353-374; Peter Malcolm Holt, *The age of the Crusades*, London: Longman, 1986, pp. 107-20; Robert Irwin, *The Middle East in the Middle Ages*, London: Croom Helm, 1986, pp. 85-124; Amalia Levanoni, *A Turning Point in Mamluk History: The Third Reign of al-Nāṣir Muḥammad Ibn Qalāwūn (1310-1341)*, Leiden, New York and Köln: Brill, 1995.

an author who writes a book and offers it to the ruler, who accepts it as a gift and rewards him with a suitable gift, either a large sum of money or a position of high status. This picture is a literary fiction. There were codes of behaviour for bringing gifts to the sovereign, and the sultan certainly knew about it and perhaps even ordered gifts in advance, rewarding the author for his efforts with money and gifts. The Mamluks' love of acquiring valuable books is often mentioned in the sources of the period, and this applies not only to the sultan himself, as we may see from the biographies of high-ranking Mamluks. Abū Bakr differs from the two groups of writers mentioned above (the scholars and the 'men of horses') if only in terms of motivation. In writing this treatise he did not seek honor and prestige as a great scholar, and it is doubtful whether the book would have furthered him in his professional career.

We know very little about him apart from the fact that he was the court veterinarian and was responsible for the veterinary care of the horses in the sultan's stables.¹¹⁸ His biography, based mainly on details that he mentions in the book, tells us that he followed in the footsteps of his father, who was also a veterinarian in the service of Mamluk sultans. His father, Badr al-Dīn, known as *al-Bayṭār* (the veterinarian), was also one of his major sources on everything connected with the treatment of horses. Abū Bakr's book is known by different names: *Kāshif Hamm al-Wayl fī Ma'rifat Amrāḍ al-Khayl* (Revealer of the Trouble of Evils Related to the Knowledge of Horse Diseases), or *Kāmil al-Ṣinā'atayn al-Bayṭarah wa-al-Zarṭaqah* (The Perfections of the Two Arts of Hippology and Hippiatry) and also, as mentioned above, *'Al-Nāṣirī*. These are not necessarily the original ones chosen by the author. The book deals mainly with horses, but there are some chapters devoted to other animals, such as mules and donkeys. It includes information on breed improvement of animals, horsemanship, mounted combat, care of horses, diseases of animals, medication and treatment. Abū Bakr's treatise became known in the west mainly due to its translation into French by N. Perron in the second half of the nineteenth century.¹¹⁹ Some modern scholars have summed up Abū Bakr's treatise by saying that it is based largely on early Byzantine sources, particularly Theonnestus, and on summaries of Vegetius.¹²⁰ Likewise, the writers of the entry on Abū Bakr al-Bayṭār in the *Encyclopedia of Islam* do not relate at all to the originality

¹¹⁸ Ḥājī Khalifah, *Kashf al-zunūn*, vol. III, p. 1380.

¹¹⁹ Perron, *Le Nācerī*.

¹²⁰ A Roman author, apparently from the late 4th and early 5th century, who wrote a treatise in Latin titled *Mulomedecina*. For a discussion of the Greco-Roman-Byzantine tradition, see chapter 2.

of his work. They describe the book as purely a compilation of materials from earlier sources, particularly from the work of Ibn Akhī Ḥizām (ninth-tenth cent.), which bore a similar title, *Kāmil al-Ṣināʿatayn—al-bayṭarah waʾl-zarʿaḥ*.¹²¹ In my opinion, this description is inaccurate and appears to be an attempt to reject all the developments and innovations that had occurred over the years. It also ignores both the author's apprenticeship under his father as well as his own experience as a practicing veterinarian.

Unlike the treatises hitherto mentioned, in which the chapters on medical treatment of animals are not necessarily the main part of the book, the medical aspects are central in Abū Bakr's book. As well as relying to a considerable extent on the knowledge that he learnt from his father, he cites other sources from various traditions, Arab and non-Arab. Some of these belong to the Greek tradition, as indicated by "the ancients said" or "it says in the ancient books." Most of these books belong to the Byzantine culture, in particular the book by Theonnestus. However, names such as Aristotle, Hermes, Galen and Hippocrates are also cited.¹²² Abū Bakr also drew material from Indian, Persian and Turkish sources, saying "the Indian sages said," "The Persian sages said." Among his early Arabic sources he mentions names like Abū Yūsuf and Muḥammad Ibn Akhī Ḥizām al-Jabalī al-Khutlī, who is credited with writing the first veterinary treatise in Arabic.¹²³

Unlike his predecessors, even when he quotes the ancients Abū Bakr is quite critical of them, often saying that these things are groundless or

¹²¹ J. Ruska-[F. Viré], "Ibn Al-Mundhir," *E.I.*², vol. III (1971), pp. 890-891. The title of the manuscript attributed to Ibn Akhī Ḥizām, kept in the National Library in London is *Kitāb al-Furūsiyah wa-shiyyāt al-khayl*. It should be noted that the earliest copies of this manuscript, like those of all the other veterinary treatises, are from the Mamluk period. It may be assumed that many changes and not a few distortions occurred in the original texts during the process of copying, and a great deal of material was added during the hundreds of years of copying them. A comparison of Ibn Akhī Ḥizām's manuscript with that of Abū Bakr shows considerable differences, especially concerning Abū Bakr's personal experience of veterinary practise, and its incorporation in this book makes it infinitely superior to that of Ibn Akhī Ḥizām. See "كتاب الفروسية وشيات الخيل، مما جمعه وصنفه أبو يوسف يعقوب بن أخي حزام": B.L., MS. ADD. 23,416. *رايض المعتضد من تجارب العرب والهند والفرس وغيرهم*

¹²² Abū Bakr al-Bayṭār, *Kāshif*. Vol. I, p. 53.

¹²³ *Ibid.* See also Björck, "Griechische Pferdeheilkunde," pp. 1-12; Veronica Weidenhöfer, Martin Heide and Joris Peters, "Zur Frage der Kontinuität des hippiatrischen Erbes der Antike: Die Behandlung von Erkrankungen des Bewegungsapparates im Kitāb al-furūsiya wa-l-bayṭara von Muḥammad ibn Ya'qūb ibn aḥī Ḥizām al-Ḥuttlī," *Sudhoffs Archiv*, vol. LXXXIX (2005), pp. 58-95; Martin Heide, "Beschreibung und Behandlung einiger Erkrankungen, die die Extremitäten der Pferde betreffen aus dem Kitāb al-furūsiya wa-l-bayṭara des Muḥammad ibn aḥī Ḥizām al-Ḥuttlī," *Die Welts des Orients*, Herausgegeben von Heinz Halm und Wolfgang Rölling, Band XXXIV (2004), pp. 105-152.

unproven hypotheses.¹²⁴ Treatments suggested by others, whose names he does not mention, are usually presented with great skepticism, expressed by his use of the word “claimed” (*yuz‘amu*), or “The Glorified and Exalted Lord knows” (*Allāh subhānah^u wa-t‘ālā a‘lam*).¹²⁵ Sometimes his criticism is directed at a specific prescription or treatment whose effectiveness he questions; for example, he warns against the treatment recommended for *ṣudām*, explaining that it is not good to use the methods of the ancients or those recommending bloodletting,¹²⁶ although he is not totally opposed to bloodletting, and sometimes agrees with the ancients on its use.¹²⁷ Discussing the disease called *al-zamin*, he asserts, as opposed to the opinion of the ancients, that it cannot be cured, and that the treatments recommended for this disease are designed only to alleviate it.¹²⁸

Occasionally, Abū Bakr writes that he actually tried a treatment recommended by the ancients, and recommended its use only after being convinced that it was effective. Treatments that successfully passed Abū Bakr’s practical test were, so to speak, transformed from relics of the distant past into practical methods that could be applied in his times.¹²⁹

In cases where he has reservations concerning a treatment suggested by the ancients, such as using a frog soup to cure a horse who swallowed a frog, Abū Bakr expresses his doubt by the words “The Lord knows” (والله يعلم).¹³⁰ In the context of medical treatment, this formula reveals Abū Bakr’s skepticism regarding the efficacy of the treatment itself, in contrast with another expression that appears in his book in cases when he recommends treatment that he considers more efficient, such as “effective with God’s help” (نافع ان شاء الله).¹³¹ In some cases, Abū Bakr quotes the ancients in

¹²⁴ “على ما ذكر المتقدمون”: Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 137; “داء الحية على ما ذكره المتقدمون”: Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 145. Sometimes, Abū Bakr uses the expression “they imagined or thought without grounds” in order to express his skepticism regarding the information supplied by the ancients (وانما وهموا في كتبهم). See Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 145.

¹²⁵ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 255, 359, 367, 395.

¹²⁶ “لا ينبغي أن يعالج بالفصد كما ذكر المتقدمون”: *Ibid.*, p. 151.

¹²⁷ *Ibid.*, p. 153.

¹²⁸ *Ibid.*, p. 255.

¹²⁹ For example, Abū Bakr remarks that he himself tried methods of Ibn Akhī Ḥizām that were mentioned by the ancients, and thus makes that ancient treatment relevant to his time. Regarding the treatment of “*al-mashash*,” a disease that affects the nerve muscles, he notes that the ancients mention several treatments, which he tried himself (فان له علاجات). See *Ibid.*, p. 249.

¹³⁰ See *Ibid.*, p. 217.

¹³¹ *Ibid.*, pp. 223, 271, 305, 309, etc.

order to criticize them, to show the reader their mistakes and explain that he does not agree with their judgment concerning a certain disease. For example, after quoting the ancient sources' opinion that the disease known as "cow's disease" (*dā' al-baqar*) is incurable, he describes a method of his own, thus rebutting the judgment of the ancients.¹³² Abū Bakr even warns sternly against using the cures of the ancients, explaining to his readers that these methods might be injurious or even fatal to the animal. One example of such treatment concerns the attempt to cure a twisted neck by stepping on the neck area. Abū Bakr states that this treatment, which was recommended in the past, is very dangerous and may cause the death of the animal, emphasizing that no horse or any other animal could survive this treatment.¹³³ He also has reservations about a treatment for *al-dhībah* that appears in the writings of the ancients, which he considers very dangerous.¹³⁴ Another method of the ancients described by Abū Bakr portrays the ancients as "the first" to cure the disease known as *al-qaṣr* which was cured by putting the sick animal into a heap of dung.¹³⁵ In this case he does not actually criticize the method but suggests using it only as a supplement to other treatments that he recommends first.

Abū Bakr devotes an entire chapter to a description of the forms used in branding horses (*ṣifat al-dāghāt*), classifying in great detail the brands by their ethnic origin. Interestingly enough, the sources he uses on this topic are more varied than his sources on professional medical material. He ascribes different brands to different nations, countries, and even to specific cities. Thus we find Egyptian, Roman, Indian, Tartar, Syrian (meaning Damascene), Aleppo, Maghreb and Frankish brands. However, he does not distinguish between the different western brands but groups them all together as Frankish forms (*al-dāghāt al-ifranjīyah*). He also refers to ancient brands, which he calls *Dā'ūdīyah*, ascribing them to King David.¹³⁶

¹³² The treatment that he claims is effective includes several mineral and plant substances, such as *kahrabā*, *ṭabāshūr*, and seeds of the *rijlah* plant in equal quantities, mixed with a liquid derived from the *lisān al-ḥamal* plant. He also describes another treatment with natural substances such as seeds of *ḥummād*, *qaṭūnyā* and *kathirah*, mixed with an extract of *lisān al-ḥamal*, and administered to the sick animal suffering from *al-baqar* disease. See Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 311.

¹³³ *Ibid.*, p. 223.

¹³⁴ *Ibid.*, p. 243.

¹³⁵ "مداواة القصر—وقد كانت الاوائل اذا قصر عندهم حيوان يدفونه في الزبل، على ما ذكره في كتبهم": *Ibid.*, p. 219.

¹³⁶ *Ibid.*, vol. I, p. 227. In the Islamic tradition King David is credited with being the first to tame horses and turn them into domesticated animals. Many veterinary books write that the first horses trained to serve man were under King David's supervision and in his stables,

Abū Bakr's critical approach is even more striking when compared to authors such as Ibn al-ʿAwwām and al-Ṣāhib Tāj al-Dīn, who were not veterinarians and did not understand all the material that they collected and incorporated in their books. Thus, Abū Bakr criticizes statements of Ibn Akhī Ḥizām, while Ibn al-ʿAwwām quotes them without question. For instance, discussing bloodletting in case of heart illnesses, Ibn al-ʿAwwām, who cites Ibn Akhī Ḥizām, writes that it can be done from almost every part of the animal's body, whereas Abū Bakr emphasizes that it should be performed from the animal's forelegs and chest.¹³⁷ Both Ibn Akhī Ḥizām and Ibn al-ʿAwwām recommend giving the sick animal sweet drinks as an effective treatment for heart disease, but there is a certain difference in the ingredients of the medicine, especially with regard to the sweetening agent—most probably honey.¹³⁸ In contrast, Abū Bakr suggests using sugar, which was common in his time.¹³⁹ Another example concerns the treatment of a disease that causes tearing of the animal's lung. Although both authors describe similar signs for identifying the disease, the treatments they recommend are significantly different. Abū Bakr does not recommend bloodletting, unlike Ibn al-ʿAwwām, citing Ibn Akhī Ḥizām. For the treatment of this ailment these authors recommended using similar medical substances, but the quantities and compositions are different.¹⁴⁰

although King Solomon is sometimes credited with this. Abū Bakr refers to the shapes with which King David's horses were branded, calling them *al-Dāʿūdīyah*. He not only describes the shapes in words but also depicts them graphically. It is interesting that the Muslim brands are mostly based on Arabic letters and words related to health (*ʿāfiyah*), while the brands of the ancients, such as those attributed to King David, the Romans, Indians and Franks, and also those from Aleppo, are based on geometrical shapes, lines and crosses. See *Ibid.*, p. 226-231.

¹³⁷ Ibn al-ʿAwwām, *Kitāb al-Filāḥah*, vol. II, p. 605; Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 367.

¹³⁸ The medical use of sugar was not common in Ibn Akhī Ḥizām's time, and it is doubtful whether it was known as a sweetening agent for medical purposes; it may be assumed that the early author meant honey. About the use of sugar in medieval Islam see David Waines, "Sukkar," *E.I.*², vol. IX (1997), pp. 804-805; Amīn al-Dawlah abū al-Faraj Ibn al-Quff al-Karakī, *Jāmiʿ al-gharaḍ fī ḥifẓ al-ṣiḥḥah wa- daʿ al-maraḍ*, ed. S. Hamarneh, Amman: Manshūrāt al-Jāmiʿah al-Urduniyah, 1989; Dāwūd al-Anṭākī, *Tadhkirat ulī al-albāb*, repr. Beirut n. d.; *Kanz al-fawā'id fī tanwīʿ al-mawā'id*, eds. Manuela Marín and David Waines, Stuttgart-Beirut: Franz Steiner, 1993; Mohamed Ouerfelli, *Le sucre. Production, commercialization et usages dans la Méditerranée médiévale*, Leiden-Boston: Brill, 2008, pp. 503-660.

¹³⁹ As opposed to Abū Bakr al-Bayṭār, who often speaks of sugar as an important ingredient in preparing a mixture, Ibn al-ʿAwwām does not mention the use of sugar in any medical prescription. See Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 367.

¹⁴⁰ Both books suggest using lupins, goat's milk and other substances. *Ibid.*, p. 369; Ibn al-ʿAwwām, *Kitāb al-Filāḥah*, vol. II, pp. 608-609.

As he states, Abū Bakr's work is based both on the written sources he cites and on family knowledge handed down to him from previous generations.¹⁴¹ His practical experience as court veterinarian responsible for the horses also served him as a basis in writing the book, and this is particularly evident in his criticism of material that he quotes from earlier sources. Besides his father, who was his teacher and one of his major sources of professional knowledge, we find in the book that several of his family members were also veterinarians. He mentions, for example, two uncles who treated horses. One of them, al-Jammāl Maḥmūd, managed to extricate a dead foetus from a mare's womb without having to perform a Caesarian operation.¹⁴² This mare belonged to an emir named al-Qaymarī, from the Khawārizmīyah group, and he paid Abū Bakr's uncle the handsome sum of 12,000 dirhams for the treatment. Apart from family members who were veterinarians, he mentions other veterinarians whose connections with his family are not clear. Perhaps they worked in the same court at the same time, indicating professional relationships and sharing of professional knowledge among colleagues. Durayd al-Bayṭār, for example, is often mentioned in Abū Bakr's book as one of the veterinarians with whom he was in contact.¹⁴³

We can also enumerate a long list of treatments that Abū Bakr administered with his own hands. This is important for the evaluation of the treatise and it grants the book a very high status compared with other books dealing in varying degrees with veterinary medicine. For example, in describing the causes of vomiting in horses, he states that he encountered this many times in the course of his work, adding that he recommends treatment which he used himself.¹⁴⁴ The pages of his book are replete with examples of his originality, such as may be found in his discussion on diseases of donkeys and mules. One disease he mentions is *al-namlah*, that affects the feet. He describes another disease as being caused by niggardly veterinarians, who use nails that are too thick when attaching the horseshoes to the horse's hooves, causing damage and illness.¹⁴⁵ He also criticizes veterinarians who are not adept in shoeing horses, especially those who insert the nails in the wrong places, and when they want to correct their mistake, they pull out the nail causing the foot to bleed. As

¹⁴¹ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 365, 391, 395, 405, 433 etc.

¹⁴² *Ibid.*, p. 319.

¹⁴³ *Ibid.*

¹⁴⁴ Abū Bakr writes: "I have seen this many times and treated it as I will state below" (وقد رأيت ذلك كثيرا وداووته بما سنده). See *Ibid.*, p. 39.

¹⁴⁵ *Ibid.*, p. 63.

a result, infection may develop in that area due to pollution of the water, leading to severe illness which may be fatal. He describes this malpractise as something he has seen for himself, saying that he has treated horses that were harmed by such incompetent treatment of other veterinarians.¹⁴⁶ But above all, it is the medicines and the various medical preparations that he used in treating animals that testify to Abū Bakr's originality and to the personal knowledge that he learnt from his father.¹⁴⁷

D. *FURŪSĪYAH* AND JIHAD IN VETERINARY ESSAYS

The three realms of Jihad, *furūsīyah*, and veterinary science are linked together in several treatises, particularly in introductions to veterinary books. Following are a few examples:

1. A work entitled "*al-Furūsīyah wa-shiyyāt al-khayl*" discussing the subject of *furūsīyah*, describes the kinds of blotches, blemishes, birthmarks, and other bodily defects of horses which can serve to classify them as thoroughbreds or otherwise.¹⁴⁸ The original version of this work was one of the earliest treatises on veterinary medicine in Arabic. It was written by Abū Yūsuf Ya'qūb b. Akhī Ḥazām (or Ḥizām), who was an ostler in charge of the stables of the Abbasid Caliph al-Mu'taḍid (ruled 279-289/829-902). The author notes that he garnered the information from the accumulated experiences of various nations—Arabs, Persians, Indians and others.¹⁴⁹

In the introduction to his book, the author refers to his rich personal experience and states that this book is meant to help people who want to join the holy Islamic war, as well as those who engage in trade.¹⁵⁰ He emphasizes that everyone who acquires a horse should possess this book

¹⁴⁶ *Ibid.*

¹⁴⁷ In the chapter describing the medicines and medical preparations that he used, including pills, enemas, kohl for treating eye problems, laxatives, and more, Abū Bakr often repeats that he learned them from his father and that he follows in his father's footsteps in the use of these substances. See, for example, *Ibid.*, pp. 391, 395, 405, etc.

¹⁴⁸ *Shiyah*—pl. *Shiyāt* (v. *washā*): blotch, spot; blemish, flaw, fault, defect; mark, sign, see Hans Wehr, *A Dictionary of Modern Written Arabic: Arabic-English*, ed. J. Milton Cowan, Beirut-London: Librairie du Liban and Macdonald and Evans, 1980, p. 1071 [*waṣā*].

¹⁴⁹ The British Library, London, *Ms. ADD. 23.416*.

¹⁵⁰ In discussing *furūsīyah*, the writer remarks that his expertise stems from his personal experience and from having been successfully tested in the subject, that is to say, his participation in wars and battles. He also emphasizes his expertise in the tools of *furūsīyah*, meaning the weapons that were used by the Mamluks, such as swords of various kinds, lances, arrows, bullets, and so forth. The manuscript is preserved in the The British Library, London, *Ms. ADD. 23.416*, fols. 1r°-3r°.

because it contains everything he needs in the field of veterinary science, comparing it to the famous treatises of Galen in the field of human medicine. In addition to *furūsīyah*, the book covers topics related to horses, their characteristics, bodily defects and disabilities, their medical condition and illnesses, both congenital and contracted after birth. It lists the names of illnesses and the treatment recommended for each illness, the taming and handling of horses, methods of teaching equestrianism including the step by step teaching of *furūsīyah*. This is a scientific text that sees both *furūsīyah* and veterinary medicine and as subjects worthy of being included in one comprehensive book. The writer states that he aims to arouse his readers' enthusiasm for battle and inspire them to engage in Jihad and dedicate their horses to holy wars. For this purpose they have to learn *furūsīyah*.¹⁵¹ He quotes many verses from the Koran and traditional sayings of the prophet in order to support his statements on the virtues of Jihad and the Muslims' duty to engage in it. But he also states that a cavalryman is not considered a warrior even if he is expert and proficient in warfare, weapons and *furūsīyah*, unless he is also knowledgeable with regard to animals and their medical conditions.¹⁵²

2. Al-Šāhib Tāj al-Dīn, the author of an important veterinary book from the 13th century (d. 707/1307), emphasizes in the introduction that his motive for writing it was the need for a book providing the knowledge required by Jihad fighters.¹⁵³ He explains that he acquired this knowledge over many years of practical experience as a horseman and a warrior.¹⁵⁴

3. Another veterinary treatise, dated 892/1487, sums up the essence of *furūsīyah*.¹⁵⁵ The anonymous author states that the basis of *furūsīyah* is keeping the horse's bridle and reins in good condition. He describes the rider's position on the horse, saying that he must look straight ahead at where his horse's hooves touch the ground. The rider has to be adept at tightening or loosening the reins as the situation requires, and he must know how to take care of all the relevant accessories, such as how to saddle the horse and put on the bridle or bit. The author is especially interested in the subject of taming horses, which he also includes in the body of knowledge that the rider has to learn, specifying among other things where

¹⁵¹ The British Library, London, Ms. ADD. 23.416, fol. 4r°.

¹⁵² *Ibid.*, fol. 16r°.

¹⁵³ Al-Šāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 23.

¹⁵⁴ *Ibid.*

¹⁵⁵ The British Library, London, Ms. ADD. 7513 [كتاب في معرفة علم الخيل وآدابهم وتربيتهم وعلاجهم [لبعض المصنفين].

the rider can whip the horse to make it gallop without wounding or hurting it. In summary, according to this manuscript *furūsiyah* related to the art of horseback riding, but it also requires knowledge of taming and training horses, in addition to their handling and grooming.¹⁵⁶

4. The most salient example of the link between veterinary science, *furūsiyah* and Jihad appears in the introduction and the first chapter of the most important and comprehensive veterinary treatise of the Mamluk period, whose author, Abū Bakr al-Bayṭār (d. 741/1340), was in charge of the stables of Sultan al-Nāṣir Muḥammad b. Qalāwūn. The author, who was not a fighter and whose entire role consisted of taking care of the sultan's horses, stresses in the introduction, which deals mostly with medicine, that the book contains valuable information on *furūsiyah*,¹⁵⁷ and he devotes the first chapter to Jihad under the title "The merits of Jihad, its participants, and the merits of horses."¹⁵⁸ In this short chapter he quotes passages from the Koran, sayings of the Prophet, and some verses praising Jihad. In this, he follows in the footsteps of many earlier writers. Clearly, the subject of Jihad was not his major interest and, to all appearances, its inclusion at the beginning of a professional veterinary book was a convention that he could not breach.

The veterinary literature often points to a direct link between the horse's behaviour and the way it is handled in accordance with the behavioural codes of high society. Special emphasis was placed on training in the case of a horse that was designated for the sultan. The trainers had to make sure that its behaviour was suitable and they had to eradicate any kind of inappropriate behaviour that might cause indignity to its royal rider or to the event in which the horse participated, whether it was a procession, a celebration, or any other public appearance of the sultan. For example, the horse's handlers or the veterinarian were required to prevent the sultan's horse from emitting wind while the sultan was riding it.¹⁵⁹ Other problems discussed in the veterinary sources also concern various kinds of bodily emissions. They note that it is not appropriate for a king to ride a horse

¹⁵⁶ *Ibid.*, fol. 24r^o [وأصل الفروسية وكما لها حفظ العنان ونظر الفارس أمام فرسه وحيث يقع الفرس يديه] ويعهده لآلته من سرجه ولجامه يقصر منه ما لا يحتاج إلى تقصير ويضيق منه ما لا يحتاج إلى تضيق ويطول منه ما لا يحتاج إلى تطويله، كل ذلك يفعله بوزن ولا يضرب الفرس من وجنته فإنه مفسدة له وتبلة بل يضربه على أمسيه (؟) إذا الجأه إلى ذلك وفي القيدوم والمضروب لأنه لا يتقدم إليه منه ويسرج منه ويركب وينزل منه ويحسن وينقص . . . [و يرفع ويحبل منه وهو جانب الفرس الابطي . . .]. See also figure 13.

¹⁵⁷ Abū Bakr, *Kāshif*, vol. I, p. 47.

¹⁵⁸ *Ibid.*, p. 63.

¹⁵⁹ The British Library, London, Ms. ADD. 7513, fols. 10r^o [باب الفرس الذي يضطر].

that dribbles from the mouth, or recoils from having the bit in its mouth, or shows even the slightest sign of resistance to being ridden by the sultan, or neighs a lot, resists being saddled, attempts to shake off the rider, kicks with its two back legs, and so forth. All these are described by the veterinarians as behavioural problems that can be treated and even completely cured with patience and time (sometimes up to a whole year).¹⁶⁰

¹⁶⁰ In one treatise the writer elaborates on each of the defects that are liable to detract from the dignity of the sultan who rides the horse in a public appearance. He suggests treating the defects and avoiding embarrassment to the sultan. Among these defects he enumerates kicking with both hindlegs, coming to a standstill and refusing to budge, being too mischievous and playing with the rider, digestive problems that cause the horse to emit wind, neighing a lot, dribbling from the mouth, sticking out its tongue, throwing off the reins or the straps, refusing to be saddled or bridled, preventing a rider from mounting it, and many more problems, for most of which the writer offers solutions. See *ibid.*, fols. 101^o–111^o.

CHAPTER FOUR

THE VETERINARY PROFESSION

A. IDENTITY, ORIGIN AND SOCIAL STATUS

1. *Identity and Origin of Veterinarians and Animal Caretakers*

Veterinary treatises and other Arabic sources mention the names of professionals who treated animals medically and those who were responsible for their training and care prior to and during hunts. One of the richest sources on the subject is the book by Usāmah b. Munqidh (d. 1188), “*Kitāb al-I‘tibār*.” Although it preceded the period discussed here, it is important for our purpose, being a rare example of a source that relates in detail and personally to the care of animals, such as dog handlers, cheetah handlers and falconers/hawkers. Ibn Munqidh provides extensive descriptions of hunting expeditions organized by his father, the governor of Shayzar, in which he himself took part, mentioning the names of many people who engaged in hunting and others who were responsible for the care of certain animals. Perhaps the most important of these was Ghanā’im, to whom Ibn Munqidh always refers as hawker (*al-bāzyār*) in his father’s court.¹ He describes Ghanā’im as a great expert in the treatment of various hunting birds such as the Peregrine (*shāhīn*) and the goshawk (*bāz*), and also refers to his personal characteristics as a congenial person who behaved according to the court etiquette, and an affable conversationalist. While these traits are not related to veterinary treatment, they help to explain how he became one of the ruler’s intimate friends and a constant companion (*nadīm*) on his hunting trips. It is not unlikely that he was chosen to be a *nadīm* in the court for these traits more than for his expertise on hunting birds.²

Ibn Munqidh also mentions other experts on hunting who functioned in his father’s court. Among these were the Saqqārūn, who handled the Sakers, and the Kalābizīyah, or Kalābidhah, who were responsible for the

¹ Ibn Munqidh, *Kitāb al-I‘tibār*, pp. 201, 203.

² Although Ghanā’im is not referred to in the treatise as a *nadīm*, his closeness to the ruler and the warm relationship between them points to the fact that he was a beloved companion. See *ibid.*, p. 219.

hunting dogs, and are mentioned by name. One of the dog handlers was called Zarzūr al-Bādiyah ('desert starling')³ and another was named Butrus. The latter must have been a Christian (the name is equivalent to 'Peter'), a fact that did not prevent him being employed at court.⁴

Another Christian, a certain Niqūlā (= Nicholas), is mentioned by Usāmah as one of the persons who joined his father's hunting trips; when his father flew a goshawk towards a bird of the francolin family, "the Mamluk Niqūlā," as he calls him, was the one who handled the goshawk and removed the prey from its beak. He recalls another incident, when Niqūlā, who had rushed as usual towards the goshawk, which had caught a francolin, ran back to the group shouting in alarm. He told them that a lion was lying in wait near the place where the hawk stood with its prey, so he had run for his life, leaving the bird with its prey. Suddenly, they saw the lion slinking away into the nearby forest, apparently frightened by the ringing of the hawk's bells.⁵

Usāmah also writes about the group of cheetah handlers, known as *fuhhād*, and describes particularly the special relations that developed between a woman and a female cheetah. This woman, a slave who worked in his father's palace, was responsible for taking care of the cheetah when she returned from the hunt.⁶

From Usāmah's book we learn that non-Muslims were employed in handling animals at a lower level than that of professional veterinarians, mainly in serving the falconer or helping him to bring in the quarry after releasing the hawk or the falcon, or as dog handlers, whose status was generally inferior to that of falconers. Sources from the Mamluk period mention only names of Muslims as being employed at the higher levels of falconry or in the medical treatment of horses. However, although no evidence has been found in this respect, we may assume that the descendants of Christians from the region of Syria who had been employed in these occupations during the lifetime of Ibn Munqidh, also continued in these same occupations. This hypothesis is based on the evidence regarding members of other ethnic groups who engaged in treating animals, such as the group of elephant keepers in the Rasūlid court in Yemen. These experts, supposedly Muslims, were of Indian origin, but already born in Yemen, and were, in fact, the descendants of experts who had come from India

³ *Ibid.*, p. 224.

⁴ *Ibid.*

⁵ *Ibid.*, p. 218.

⁶ *Ibid.*, pp. 207-208.

accompanying elephants that were sent there as a gift.⁷ Another example is the mention of "Armenians," who were reputed to be great experts on the taming and handling of hawks;⁸ these were probably Mamluks of Armenian origin who were already brought up as Muslims in Egypt. At any rate, falconry, hunting and *furūsīyah*, and all the aspects of treating animals at court, were, apparently, not common among Christians and Jews in Mamluk society.

Outside the court too, there is also very little evidence of employment of non-Muslims in veterinary medicine; the only recorded case is that of a Jewish veterinarian who is described as working in a village in southern Egypt.⁹ Since this is the only evidence we have in this regard, the involvement of Jews in this profession might have been marginal. Jews and Christians also do not figure among the authors of veterinary literature. This is particularly salient in light of the fact that many of the *Ahl al-dhimmah*, particularly Jews, engaged in human medicine.¹⁰

2. Social Status

Attempting to place veterinarians and animals carers in the socio-economic hierarchy of Mamluk society, we need to look at the different components of this group, since it included several categories of people, each connected in a particular way or level to the care and treatment of animals. We may divide these groups into five categories: members of the Mamluk elite who used animals (falcons, hawks, cheetahs, horses etc.) for sport and warfare; Mamluk functionaries, who were responsible for the animals used by the Mamluk state; practicing veterinarians who earned their living in this profession; animals handlers and keepers who, though not being professorial veterinarians, were expected to have some knowledge in this field; and writers of veterinary treatises, who did not presume to know the subject in practise. Those belonging to the first category are referred to throughout this book. The last category has been treated in the previous chapter. In this section we shall focus on the three remaining categories.

⁷ Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, pp. 397, 403.

⁸ Al-Šāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, pp. 98, 99, 102, etc.

⁹ S.D. Goitein, *A Mediterranean Society: The Jewish Communities of the Arab World as Portrayed in the Documents of the Cairo Geniza*, Berkeley: University of California Press, 1999, vol. II (The Community), pp. 45-46.

¹⁰ *Ibid.*, vol. II, pp. 254-257.

The *amīr ākhūr* was the person responsible for the horses and the other animals in the sultan's stables.¹¹ According to al-Maqrīzī, this was one of the most important roles in the Mamluk kingdom. The range of his responsibilities included financial management of the stables and supervision of the large budget allotted for maintaining the horses and the other animals, including food, medical care, purchase of riding equipment, wages for the stable workers, including veterinarians in the service of the court, keepers, trainers, cleaners and all the others employed in the stables, as well as a special budget for purchasing new horses.¹²

According to al-Maqrīzī, it was the sultan al-Malik al-Nāṣir Muḥammad Ibn Qalāwūn (ruled: 1293-1294; 1298-1308; 1309-1341) who raised this office to a prominent position. Al-Qalqashandī notes that Mamluks holding this title were generally of the senior grade of *muqaddam alf*.¹³

Mamluk chronicles also mention the *nāẓir al-iṣṭabl al-sultānī* as the person in charge of the sultan's stables in Cairo, also providing names of people who served in this role. It is to be assumed that this functionary was subordinate to the *amīr ākhūr*.¹⁴ Under the *nāẓir al-iṣṭabl al-sultānī*, we find the *kuttāb al-iṣṭabl* (stable secretaries/clerks). Their job was to record the date of birth of every foal, its physical description, including all the details and special markings on its body, and of course, details of its lineage, including the names of the sire and dam and their connection to a certain line of descent. These clerks also recorded all the horses that were purchased for the court, and the details of everyone who received a horse as a gift from the sultan, whether in the context of gifts presented by the Mamluk sultans on various occasions in order to ensure their soldiers' loyalty, or as a gift to an individual whom the sultan wished to honor.¹⁵

The *amīr shikār*, who was appointed directly by the sultan, was responsible for all the sultan's hunting animals, whether four-legged animals like

¹¹ Al-Qalqashandī explains that *akhūr* means barn (*ma'laf*) in Persian. See al-Qalqashandī, *Ṣubḥ al-a'shā*, vol. V, p. 461.

¹² Al-Maqrīzī writes that the duties of the *Amīr* responsible for the sultan's stables included the budget for the upkeep of the stables and their surroundings “الحديث في أموال” *الاصلطلات والمناخات وعليها* and all the ongoing expenditure on the horses. Al-Maqrīzī, *al-Khiṭaṭ*, vol. III, p. 365.

¹³ *Ibid.*; al-Qalqashandī, *Ṣubḥ al-a'shā*, vol. IV, pp. 18-19.

¹⁴ One of those mentioned is Yaḥyā b. al-Bakrī, who served as *nāẓir al-iṣṭabl*—head of the stables. The chronicles give the year of his death expressing appreciation for the quality of his work. Shams al-Dīn b. Muzāḥim al-Ṭarābilsī succeeded him in this position in the month of Shawwāl 904 H. See Ibn Iyās, *Badā'ī' al-zuhūr*, vol. III, pp. 420, 424.

¹⁵ Al-Maqrīzī, *al-Khiṭaṭ*, vol. III, p. 366.

dogs and cheetahs or various hunting birds.¹⁶ Al-Nāshirī, the author of a hunting book from the Mamluk period, writes that the *amīr shikār* has to be expert, at least partly, “in the laws and rules concerning hunting with animals,” so as to be able to oversee the actions of those subordinate to him among the falconers and trainers of other hunting animals, and to ensure that the animals entrusted to the tamers meet the requirements.¹⁷ The fact that this *amīr* was expected to have some kind of professional training is also reflected in al-Nāshirī’s remark that anyone appointed to this role should thank and bless God for not leaving him in the inferior position of animal trainer and keeper (*sā’is*).¹⁸

In addition to all this professional knowledge, al-Nāshirī asserts that the bearer of this role is required to know the religious laws of ritual purity connected with hunting. This question—of purity of the meat of the quarry—is discussed at length in treatises on hunting and falconry, according to Islamic religious laws. To be expert in these laws, says al-Nāshirī, the *amīr shikār* must also have a broad education in religion and religious observance.¹⁹

As head of a hierarchy of a large group of people involved in hunting, the *amīr shikār* was also responsible for the food budget allocated for feeding the hunting animals. This was a substantial budget and the management of the money called for financial skills. We learn from various sources that when it was necessary to cut the court budget due to financial difficulties and the state coffers were empty, those who were mainly affected were the groups involved with hunting—the dog handlers, the falconers and the cheetah handlers.²⁰

From al-Nāshirī’s brief description of the *amīr shikār*’s role, we can conclude that this functionary was very close to the sultan; this is also indicated by the names of people (all of them Mamluks) who were ap-

¹⁶ On the *amīr shikār* and his political status, see Herbert Eisenstein, “Der *amīr šikār* unter den Mamlukensultanen,” *XXV Deutscher Orientalistentag. Vorträge, München, 8-13 April 1991*, ed. by Cornelia Wunsch (*Zeitschrift der deutschen morgenländischen Gesellschaft*, Supplement 10) Franz Steiner Verlag, Stuttgart, 1994, pp. 129-135.

¹⁷ Al-Nāshirī, *Intihāz al-furās*, pp. 55, 85.

¹⁸ *Ibid.*, p. 85.

¹⁹ *Ibid.* Even if the *amīr shakār* (or *shikār*) was expected to be knowledgeable concerning the rules pertaining to the purity of the meat and the purity and impurity of animals that were hunted, expertise on these aspects of the *amīr shakār*’s role was apparently not what interested the sultan when he chose the man to fill this job. Presumably the Mamluk sultan and his hunting companions did not bother to study the laws of ritual purity and certainly did not act according to them.

²⁰ On cutbacks in the jobs of various groups involved with hunting in the sultan’s court, see al-Maqrizī, *al-Sulūk*, vol. II, p. 749.

pointed to this office, were dismissed, died, punished, or rewarded with gifts from the sultan as a mark of appreciation for filling this role. Sometimes we read of an official being transferred from this position to the role of *amīr ākhūr*.²¹

It seems that governors of important provincial centres, such as Damascus, also had their own *amīr shikār*, as can be deduced from an episode told by fourteenth-century chronicles.²²

Another role, similar to that of *amīr shikār*, was that of keeper of the birds, *ḥāris al-ṭayr*. Apart from describing the status of this role bearer as a high-ranking emir who might even be appointed governor of a region on behalf of the sultan, the sources provide very little information on this charge.²³

The second category including people who treated and trained hunting animals such as hawks, falcons, dogs, cheetahs, and the carers of horses, donkeys and mules at court, all of whom apparently also belonged to the Mamluk group, and thus possessed high social status. Their living quarters at the sultan's court, especially in the area of the stables, indicates their Mamluk identity. Evidence of their high status and their close relations with the sultan can be found in the presents they received. Sultan al-Malik

²¹ In the year 740/1339 we read that the *amīr shikār* was punished severely by whipping for not performing his task properly. In this context we learn of another duty of the *amīr shikār*—to guard prisoners. [Ibn Taghrī Birdī, *al-Nujūm al-zāhirah*, vol. IX, pp. 103-104] In 741/1340, a certain Mughlaṭāi was appointed to this position, and a year after that (742) the emir Qamarī al-Ḥusnī was appointed to the post; later, when he was appointed *amīr ākhūr*, he was replaced by the *amīr* Aḥmad, who had previously been responsible for the sultan's drinks as *shād shurbkhānih*. On people who filled the role of *amīr shikār*, see al-Maqrizī, *al-Sulūk*, vol. II, pp. 13-14, 314, 479, 559, 588, 605, 628 etc.; Ibn Aybak al-Dawādārī, *Kanz al-durar* (ed. Harman and Roimer, Cairo, 1971) vol. VIII, pp. 88, 346; al-Shujā'i, *Tārīkh al-Malik al-Nāṣir*, ed. Barbara Shiefer, Fispaden, 1987, pp. 92, 29, 126, 210; al-Balādī, *al-Kāfi fi al-bayzarah*, p. 41 (note of the ed.). Ibn Taghrī Birdī's chronicle contains descriptions of all the role bearers in Mamluk society, such as *amīr jundār*, *khāzindār*, *shād shurbkhāneh*, *amīr ṭablkhānah*, *amīr ākhūr*, and more. See Ibn Taghrī Birdī, *Ḥawāḍith al-duhūr*, vol. I, pp. 53-65.

²² Muḥammad b. Kanjī Naṣir al-Dīn (d. 755/1354), who functioned as *amīr shikār* in Damascus, was also appointed as *amīr ṭablkhānah* (drum major), another important role in the Mamluk hierarchy. See Ibn Ḥajar al-ʿAsqalānī, *al-Durar al-kāminah*, vol. IV, p. 151; al-Suyūṭī, *Ḥusn al-muḥāḍarah*, vol. II, p. 133. On the *ṭablkhānah*, see al-Qalqashandī, *Ṣubḥ al-a'shā*, vol. IV, p. 13.

²³ The role of *ḥāris al-ṭayr* appears in a book of biographies by Ibn Ḥajar al-ʿAsqalānī. He mentions the name of Baybughā Tatar, who, in addition to this role also belonged to a group of senior Mamluk emirs in Egypt, and he was appointed governor of Gaza several times. He reached the highest rank in the Mamluk hierarchy when he was finally appointed deputy to the sultan in Cairo. Al-ʿAsqalānī relates that this emir came to a bad end and died destitute in Tripoli in the 760s Hij. See Ibn Ḥajar al-ʿAsqalānī, *al-Durar al-kāminah*, vol. I, p. 511.

al-Nāṣir Muḥammad is reported to have given most of the falconers in his entourage a grant of one thousand dinars each and more. These sums were equal to those he gave to the *al-ḥalaqah*, the group of Mamluks who were closest to him and were responsible for guarding him.²⁴ The same sultan is also reported to have married court falconers to slave women of Turkish-Tatar origin, which also indicates their high status among the Mamluks.²⁵ As will be explained further on, there was also an inner hierarchy within these various groups, since before becoming a falconer, or a keeper of another kind of animal at court one had to go through a period of apprenticeship and later serve as an assistant.

Let us now consider the third category, that of professional veterinarians. Those among them who treated the horses of the sultan and his entourage also seem to have enjoyed high status. One name that stands out is that of Abū Bakr al-Bayṭār, who worked as court veterinarian in the stables of Sultan al-Malik al-Nāṣir Muḥammad. He is, perhaps, the most salient example of the status of the court veterinarian who also wrote a book on the medical treatment of animals, which he dedicated to this sultan.²⁶ The high status of the court veterinarians is also reflected in the payments they received for specific treatments. Abū Bakr writes of the payment received by his two uncles for treating a pregnant mare belonging to one of the Mamluk emirs. The treatment averted the need for performing a 'Caesarian operation' (*ikhrāj al-muhr idhā māt*), which might have caused the death of the mare, when they succeeded in removing a dead foetus from its mother's womb without surgery. The high sum (12,000 *dirhams*) that they are said to have received for this treatment could only be expected by veterinarians who treated horses in the courts of emirs and sultans.²⁷

We rarely find mention of the wages of an "ordinary" veterinarian who did not work at the sultan's court. Such a case, of a veterinarian who treated animals in a village, belongs to the Ayyubid period, but we may assume that the situation had not changed very much in later generations. It involves a donkey who suffered from a sprained leg caused by carrying building materials. The veterinarian (*bayṭār*) who treated it was paid a quarter of a dinar, which was not a small sum, taking into account the price

²⁴ On the *al-ḥalaqa* group, known as *junūd al-ḥalaqah* or *ajṇād al-ḥalaqah*, see, for example Ibn Duqmāq, *al-Jawhar al-thamīn*, pp. 324, 490; al-Qalqashandī, *Ṣubḥ al-a'shā*, vol. IV, p. 16; al-Maqrīzī, *al-Khiṭaṭ*, vol. III, pp. 350-351.

²⁵ Al-Shujā'i, *Tā'rikh al-Malik al-Nāṣir*, p. 113.

²⁶ On Abū Bakr al-Bayṭār, see chapter III.

²⁷ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 317-319.

of a donkey at that time—approximately two dinars.²⁸ This payment received by a village veterinarian also attests to the respected status of the profession, especially if we consider that in 1240 the monthly salary of a full-time doctor working from morning to night in a Cairo hospital was three dinars.²⁹

Another document from the Cairo Geniza, dated 1232, refers to a Jewish veterinarian who headed his community in the village of Minyat Ziftā in Egypt.³⁰ The fact that a veterinarian was the head of the community is also a sign of high social status, especially in this case, since the community concerned also included doctors, pharmacists and government officials.³¹

B. PROFESSIONAL TRAINING

In his description of Cairo and its buildings, al-Maqrīzī notes that medicine was taught in various schools.³² In addition, biographical sources often mention names of people who taught medicine in the main Cairo hospital.³³ However, veterinary medicine was a practical occupation and the main emphasis in the process of learning must have been on personal experience rather than on theoretical study and books.

The veterinarian's professional training usually began at an early age. For the most part the training took place in the family framework in order to ensure that the sons would follow in the father's footsteps and preserve

²⁸ Goitein, *A Mediterranean Society*, vol. II, p. 256.

²⁹ *Ibid.*, vol. II, pp. 256-257. It can be assumed that the value of the dinar must have changed between the two periods, but the orders of magnitude are significant all the same.

³⁰ Like most of the documents from the Geniza, it is written in Arabic and Hebrew and includes the following sentence “اليطار الذي يخرج سفر تورا ويصلي.” This document appears in Goitein's published collection of documents from the Geniza, and he states that it appears in TS Arabic Box 54, f. 91, 1.5. See *Ibid.*, vol. II, p. 523.

³¹ The document states that the Minyat Ziftā community included a government official who was responsible to the authorities, two doctors, two tax collectors, a veterinarian (who was head of the community at some stage), a pharmacist, a silversmith, a dyer and three partners in a tannery. See *Ibid.*, vol. II, p. 46.

³² Al-Maqrīzī describes the school al-Manṣūriyah in Cairo and remarks that as well as teaching the four schools of Sunnah, they also taught medicine. al-Maqrīzī, *al-Khiṭaṭ*, vol. IV, p. 218.

³³ Muḥammad Abū Zāhir al-Dīn al-Mālikī al-Maghribī, who is also mentioned as being the chief muezzin in the mosque, is described as the most expert of his generation in calculating the times of prayers and festivals. His biographer states that his son, al-Shaykh Abū al-Barakāt al-Mālikī, was a teacher of *Fiqh*-jurisprudence and medicine. Thus we learn that a man of religion was also sometimes a man of the medical profession. Ibn Ḥajar al-ʿAsqalānī, *al-Durar al-kāminah*, vol. IV, p. 319.

the professional knowledge that had been developed or discovered within the family. Abū Bakr, who exercised himself this profession, refers in many cases to professional secrets that belonged to members of his family who were veterinarians.³⁴ The example of the above-mentioned descendants of elephant handlers from India who had come to take care of elephants in the court of the Yemenite king, who must also have acquired their skills from their forefathers.³⁵ The son of a veterinarian did not automatically inherit the profession from his father. He had to meet the professional requirements set by his father. It was not merely a question of technical skill that anyone could learn, but a medical profession that demanded high mental and physical capabilities of its practitioners.³⁶

The stages of training of the veterinarian are described by Abū Bakr al-Bayṭār, who reveals some illuminating facts about his own professional training. He states, for example, that at the beginning of his apprenticeship as a young boy, one of his tasks was to perform an enema to clean the bowels of a horse. He does not call it a demeaning task but rather refers to it with great respect, which he expresses by devoting a whole chapter to the equipment required for administering enemas.³⁷ Clearly, the apprentice could only perform such “menial” tasks as administering enemas after a preliminary stage in which he assisted the veterinarian by handing him the necessary medical tools or even simply holding the animal during the procedure. The stage of observing the treatment was essential for the learning process of the apprentice, who is referred to in the sources “the veterinarian’s boy.”³⁸ The treatment mentioned above (cleaning the bowels by inserting the hand into the animal’s rectum) was one of the first procedures that Abū Bakr learnt to do in his professional career. Before commencing the procedure his father told him to cut his fingernails so as to avoid scratching the horse’s intestines while inserting his hand. The boy reminded his father that he had to leave at least one fingernail uncut in order to deal with another problem that he had learnt at that time, the removal of membrane or external tissue covering the lens of the horse’s eye.³⁹ From the father’s remarks to his son, we learn about the kinds of procedures that the

³⁴ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 319.

³⁵ Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 403.

³⁶ Housni Alkhateeb Shehada, “Arab Veterinary Medicine and the ‘Golden Rules’ for Veterinarians according to a Sixteenth-Century Medical Treatise,” *Animals and People in the Ottoman Empire*, ed. Suraiya Faroqhi, Istanbul: Muhittin Eren, 2010, pp. 315–331.

³⁷ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 407.

³⁸ *Ibid.*, p. 313.

³⁹ *Ibid.*, p. 357.

young apprentice was allowed to perform under the personal supervision of the experienced teacher. Abū Bakr also mentions various methods of treating problems with horseshoes that he learnt from his father during the early stages of his apprenticeship.⁴⁰

With regard to the veterinarian's theoretical training, the sources provide very little information, but we may assume that the apprentice was required to study some treatises that included general medical knowledge, as well as pharmacological writings describing the ingredients of medicines and methods of their preparation. Extensive chapters in veterinary books instruct practitioners how to prepare medicines, specifying the exact quantities, their weight, forms, and, of course, their purpose. In an earlier chapter of this book, discussing veterinary traditions, we saw that writers of the Mamluk period based their work to a large extent on treatises from earlier times, so it is reasonable to assume that treatises attributed to earlier writers were also included among the textbooks of the apprentice veterinarian, who was obliged to study them thoroughly because they contained specific veterinary knowledge. This knowledge included anatomical material on animals and medical contents related to illness and treatment.

Important treatises on general medicine included explanations of the dominant medical theory (the doctrine of the four humours) that had prevailed unquestioned for hundreds of years and also served as the basis for theoretical veterinary studies, as expressed by the fact that there is barely a veterinary book that does not include contents related to this theory. Apart from the classification of animals according to temperament, the methods of treatment were also based on the four humours theory, particularly in the matter of bloodletting. It is not clear to what extent this medical approach was effective or necessary for the work of the veterinarian, but the fact that most of the veterinary treatises include these materials indicates that they were considered to have some importance for veterinary practise.

In various branches of human medicine, the writers of *Hisbah* literature specify certain medical treatises on which medical practitioners had to be tested by the *muḥtasib* (inspector of markets), each according to the branch of medicine they practised. For example, general doctors were tested on

⁴⁰ Abū Bakr mentions a certain type of horseshoe which he claims his father invented and taught him to use. *Ibid.*, p. 433.

the book by Yūḥanā b. Māsawayh, *‘Miḥnat al-ṭabīb’* (the doctor’s test);⁴¹ eye doctors were tested on the book by Ḥunayn Ibn Ishāq, “Ten chapters on the eye”;⁴² orthopedists were tested on the book of Būlus (Paulus);⁴³ and surgeons were tested on the contents of Galen’s Kata Genos (*Kāṭājānis*).⁴⁴ It appears from various veterinary writings, notably those of Abū Bakr al-Bayṭār, that familiarity with medical theories of this kind was also obligatory for veterinary practitioners.

What, then, was a veterinarian required to know in terms of professional training? First of all, in the sphere of hippiatry, he needed considerable knowledge in the external characteristics and descriptions of horses. Most of the treatises on horses contain long chapters on these subjects, discussing their colour, size, shape, proportions of the limbs, physical fitness, manner of walking, and the speed and manner of eating grass or drinking water. Knowledge of genealogy was also an important part of the veterinarian’s training, since it enabled him to determine whether the horse was thoroughbred. This was doubly important in the case of horses that the sultan or someone else of high status wanted to purchase, for the purchaser paid huge sums according to the expert’s decision on the horse’s pedigree. It may be assumed that they also paid a generous sum for the professional opinion of a veterinarian who was advised them in this field.⁴⁵ Abū Bakr al-Bayṭār devotes a chapter of his book to the physical examinations that the veterinarian had to perform to discover defects in the body of horses offered for sale.⁴⁶ He lists the defects that might appear in each part of the horse’s body that every veterinarian should know as part of his professional education.⁴⁷ The length of this chapter, which stretches over dozens of pages, shows that an important part of the veterinarian’s work was to give professional advice concerning the purchase of animals.

⁴¹ Ibn Bassām al-Muḥtasib, *Nihāyat al-rutbah fī ṭalab al-ḥisbah*, ed. Ḥusām al-Dīn al-Sāmārā’ī, Baghdad: Maṭba‘at al-Ma‘ārif, 1968, p. 108.

⁴² *Ibid.*, p. 199; Ibn al-Ukhūwah, *Ma‘ālim al-qurbā*, p. 168.

⁴³ Ibn Bassām al-Muḥtasib, *Nihāyat al-rutbah*, p. 121; Ibn al-Ukhūwah, *Ma‘ālim al-qurbā*, p. 169.

⁴⁴ The treatise also known as *De Compositione Medicamentorum secundum Genera*, translated (under the title *kitāb tadbīr al-adwiyah*) by Ḥubaysh, nephew of Ḥunayn b. Ishāq. See Ibn al-Ukhūwah, *Ma‘ālim al-qurbā*, p. 169 and p. 59, note 2 of the English section (separate pagination); see also Ibn Bassām al-Muḥtasib, *Nihāyat al-rutbah*, p. 122.

⁴⁵ Many sources report that Sultan al-Nāṣir Muḥammad b. Qalāwūn paid vast sums for horses bred by the Āl-Muḥannā tribe, which consequently became the richest of all the Arab tribes. See, for example, al-Maqrīzī, *al-Khiṭaṭ*, vol. III, p. 365.

⁴⁶ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, pp. 333-367.

⁴⁷ *Ibid.*, vol. I, p. 335.

The examinations described by Abū Bakr were performed on several levels, the most basic of them relying on an external examination, consisting in an observation of the size and shape of the horse, and measuring the proportions of all the parts and their symmetry: head, neck, body, forelegs and hindlegs. Usually, the veterinarian began at the head and moved down towards the hooves. According to Abū Bakr, examination of the proportions of the body and the symmetry of all its parts was important in the evaluation of the horse. For example, a big head with a narrow neck was considered a defect in the body structure; a horse with a small head and a large body was also problematic. Similarly, it was important to measure and compare the length of the forelegs with the hindlegs and check whether they matched the proportions of the whole body.⁴⁸ The examination of the legs did not end with measuring their length and proportions; the veterinarian also had to palpate them thoroughly, especially around the joints, examining the mobility of the joints and the manner of walking.⁴⁹ Other examinations include tests of hearing, during which the veterinarian called the horse loudly to test its response and the movement of its ears. Deafness caused by dirt or stones in the ear, or anything external could be treated, but if the deafness was caused by an internal factor such as an oleaginous growth in the ear, it would be more difficult to heal.⁵⁰ The veterinarian also had to open the animal's mouth and examine its tongue, the oral cavity, the condition of the teeth and their colour, the smell of the breath, and more.⁵¹

Among the common people, too, veterinarians were in demand to provide opinions concerning the health and general condition of animals offered for sale. The professional opinion of a veterinarian in the market when animals were being bought and sold entailed several thorough examinations to check for illnesses and defects not visible to the eye, since his opinion of the state of the animal's health had an influence on the animal's price. Likewise, the method of determining the animal's age and of giving a general professional opinion was part of the training of every veterinarian, and most of the veterinary treatises give detailed instructions in this regard.⁵²

⁴⁸ *Ibid.*

⁴⁹ *Ibid.*

⁵⁰ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 343.

⁵¹ *Ibid.*, vol. I, p. 347. See figure 14.

⁵² A chapter in Abū Bakr al-Bayṭār's book explains how to determine the age of a horse by the state of its teeth. See Abū Bakr al-Bayṭār, *Kāshif*, vol. I, pp. 109–111; al-Ṣāḥib Taj al-Dīn also devotes a chapter to this question, and he adds the subject of early diagnosis by the

The veterinarian was expected to discover defects or diseases that the seller of the animal tried to hide from the buyer. Apparently this was not uncommon, causing many veterinary authors to refer in their books to fraudulent behaviour involving people who were adept in concealing horses' defects or diseases, including changing a horse's colour in order to get a better price for it. Among the methods described we find, for example, searing with a hot iron to hide blemishes left by an old skin disease, using dye to change the colour of a horse's hair, and bleaching the horse's teeth to hide its advanced age.⁵³ In fact, veterinarian's proficiency was measured in the end by his success in diagnosing hidden or internal illnesses that could not be detected by external appearance.

Whether they worked with hunting animals or with horses and other animals, all these professionals had to be proficient in bloodletting, in Arabic *faṣḍ*. This is manifested in veterinary books that describe in great detail the precise location of the various arteries from which blood can be let. In human medicine two grades of bloodletters are mentioned, the *faṣḍ* and the *ḥijāmah*. The *faṣḍ* specialized in bloodletting at a very high level, including opening arteries as a means of treating certain diseases. These practitioners were generally trained specifically for this intricate work. We find in the *Hisbah* treatises that the *muḥtasib* was responsible for supervising the work of these specialists. *Faṣḍ* was also performed by veterinarians. Some veterinarians were considered experts in bloodletting and opening arteries and veins, as we learn from both *bayṭarah* and *bayzarah* treatises.⁵⁴ The *ḥijāmah*, the lower grade of bloodletters, worked at a more superficial level, using external means such as leeches, cupping glasses, or scratching the skin's surface. This type of bloodletting was very common during the Middle Ages in human medicine but apparently it was not used on animals. Presumably there was no benefit to be gained by using cupping glasses for superficial bloodletting on the skin of animals like camels, horses, mules and donkeys, not to mention the bodies of hunting birds covered with feathers.

The medical treatment of animals, also included the *ḥijāmah*—treatment by cauterization. Among humans, the *ḥajjām* usually engaged in a broad range of occupations from the domain of 'body cosmetics', such as

external appearance and facial expression of the horse—"firāsah." See al-Ṣāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, pp. 104-109.

⁵³ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 337; see also figure 14, showing a veterinarian opening a horse's mouth and examining its teeth.

⁵⁴ See chapter VIII.

removing hair from the armpit and the genital area, shaving the beard and the moustache, manicure, dyeing hair, circumcising male infants, superficial bloodletting, and cauterization properly speaking. Among those who treated animals, cauterization was very common, especially in the case of large animals such as camels.⁵⁵ It was sometimes also recommended for treating hunting birds, but in those cases it was not done with a hot iron but by a special technique that involved the use of cotton wool or pieces of cloth soaked in hot oil and laid on a certain part of the bird's body. Unlike the term *ḥajjām*, the title given to the practitioner who performed this work among humans, there was no special name for those who administered this treatment to animals. Apparently treatment by cauterization was carried out by the veterinarian himself, or perhaps the *ḥajjām* who treated humans also performed cauterization on animals.

With regard to complicated and dangerous surgical procedures such as castration, orthopedic surgery, eye operations and so forth, it is very unlikely that a veterinarian could perform them without undergoing a long training process under the supervision of a master who specialized in such procedures. In discussing methods of castrating horses, Abū Bakr describes the method that was used by his father, which he, too, learnt to perform.⁵⁶ Perhaps less categorically, we may say that the training to deal with horse-shoes was easier, although here, too, the veterinarian had to study and become familiar with the different types of nails that were suitable for different horseshoe, and learn how to prepare and file the horseshoes to fit the hooves of the horse, mule or donkey. Abū Bakr refers to farriers as veterinarians in the full sense of the word.⁵⁷

Another important component of the veterinarian's training was pharmacy (*ṣaydalāh*). Many medical substances that were used by veterinarians were also part of the stock-in-trade of human doctors, who learnt how to prepare medicines, ointments, compounds, and other preparations for medical use. Clearly, there were close contacts between those who engaged

⁵⁵ Cauterization is still practised today and is widely used in treating camels, especially among Bedouins in the Arabian peninsula, in the Sahara desert in Tunis. See Claus, "Camel diseases," *al-Ma'thūrāt al-sha'bīyah*, XXXIV (Shawwāl, 1414/April, 1994) [year 9], pp. 7-25. On the various forms of cauterization that were used for medical treatment of animals, see figures 15 a-b. See also figure 16, depicting a doctor cauterizing leprosy lesions of human patients.

⁵⁶ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 327-329.

⁵⁷ *Ibid.*, p. 423.

in pharmacy for humans, particularly those who sold the products, and those who dealt with animal medicine.⁵⁸

The taming of horses, a matter of the greatest importance in Mamluk society, was part of the veterinarian's training, although it did not really belong to the medical sphere. The student veterinarian learnt, for example, how to train horses to be ridden by the sultan in processions.⁵⁹ Training horses to participate in processions and festivities was not an easy task, especially as these were occasions with many participants, including drummers who made a great deal of noise that could frighten, confuse and agitate the horses. They had to teach the horse to control its bodily functions and refrain from defecating or urinating during the procession, to avoid emitting wind or displaying any other unseemly behaviour in the presence of the sultan.⁶⁰ Presumably, trained handlers who were experts in horses' behaviour accompanied these processions in order to solve problems of this kind.

As with horses, the training for work with hunting animals included also medical care. Al-Baladī writes that a person who wishes to deal with hunting birds has to be someone whose heart is full of love of birds and animals in general. This is the primary condition that is emphasized in a chapter listing the instructions for those who work in the area. If his heart is full of love and good intentions, the novice must begin to study the profession scientifically to be able to move on to the practical stage.⁶¹ Al-Baladī does not expand on the theoretical training, but in the practical sphere he offers some important instructions to guide the beginning student on the right path. He writes that in the first stage the apprentice has to learn from everyone who has any connection with this field, because wisdom and work can be learnt from anyone. He should observe experts in the field, known in the professional jargon as *ustādhun* and '*ulamā*', and accompany them wherever they go in the course of their professional duties. The same author enumerates some basic things that the apprentice must learn from these experts, such as their methods of tying and hooding hawks, the preparation of special tools for hunting with birds, the manner of holding the bird in one's hand, flying it at the quarry, calling to it to come back, and so forth. With regard to training methods, he asserts that this is in the realm of

⁵⁸ *Ibid.*, vol. I, p. 53.

⁵⁹ *Ibid.*, pp. 153-155; al-Sāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 175.

⁶⁰ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 143; al-Sāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 183.

⁶¹ Al-Baladī, *al-Kāfi fi al-bayṭarah*, p. 120.

“exact science,” which only clever people can learn.⁶² Comparing hawking/falconry and treatment of hunting animals with all the other occupations, he writes that there is no stage when the veterinarian can say “that is the end of my learning stage” and just go on working without studying. If the practitioner of this profession does not have a sharp mind and is not prepared to learn all the time, he will eventually become an ignoramus and all his years of experience will not give him an advantage over those who study constantly. Finally, al-Baladī notes that serving as a veterinarian also requires decorum and court etiquette, since those involved in it serve kings and sultans.⁶³

Sometimes, we read harsh criticism of veterinarians for cheapening the profession. al-Baladī, a twelfth-century author who declares that he himself is a veterinarian, writes that the gravest problem among his contemporaries who treat animals is that they take the profession lightly and fail to maintain high professional standards. He explains the reason for his criticism, saying that many veterinarians of his day caused severe damage to animals, and even death in some cases. This, according to him, is a consequence of their low professional level and their lack of skill in this work. Doctors who treat humans have to pay for their mistaken treatment or medical advice, which is not the case with those who treat animals. He calls for regulation of the professional rules and proficiency examinations for all those engaged in it.⁶⁴ Besides direct criticism of the low level of the veterinarians, the medical sources do not explicitly refer to the question of regulation, though there is some mention of this in *Ḥisbah* treatises, as will be discussed later in this chapter.

C. AREAS OF SPECIALIZATION

In human medicine of that period we find a clear division between the various specializations, as their names indicated. An eye doctor was called *kaḥḥāl*,⁶⁵ a surgeon was known as *jarrāḥ* (from the word meaning to cut), an orthopedist, who dealt mainly with broken bones, was called *mujabbir* (bone-setter), and a doctor who possessed the theoretical knowledge that enabled him to determine the temperament of the patient was usually

⁶² *Ibid.*, p. 122.

⁶³ *Ibid.*

⁶⁴ *Ibid.*

⁶⁵ We often find in the sources names of doctors who specialized in certain areas, such as eye doctors. See, for example Abū al-Fidā, *al-Mukhtaṣar*, vol. IV, p. 119.

called *ṭabā'ir*, from the word *ṭab'*, meaning nature (similar to the English etymology of the term physician). The latter was sometimes called *ḥaylasūf* (philosopher) and also *ṭabīb 'ālim*—knowledgeable doctor, titles that placed him at the head of the hierarchy of doctors because his role did not end with determining the temperament; he was also responsible for diagnosing illnesses and prescribing medication. His intervention in the patient's body ended with the diagnosis and prescription. The medications, including drugs, pills, lotions, and so forth, were bought in the pharmacy, and the pharmacist, known as *ṣaydalī* or *'ashshāb*, supplied the drugs and medicinal preparations. Another specialization in human medicine was midwifery, which was usually practised by a woman, known as *dāyah* or *qābilah*.

The veterinarian's training generally included areas of specialization with different types of animals. For example, someone who chose to work with horses was also trained in the care of draft animals such as donkeys, mules, camels and buffalos,⁶⁶ but he received no professional training in the treatment of animals that were used for hunting, such as hawks, falcons, dogs and cheetahs. Similarly, falconers or dog handlers had no professional training in the medical treatment of horses, donkeys or mules. However, these were groups that worked in close contact with each other, whether on the hunt or within the boundaries of the court, so falconers would almost certainly be present when horses were treated by veterinarians, and vice versa. Therefore, it is possible, at least theoretically, that professional knowledge was exchanged between the groups, although it is hard to say whether falconers occasionally treated horses or horse specialists treated dogs or cheetahs. In spite of the conventional division between *bayṭarah* and *bayzarah* in professional treatises, we sometimes find veterinary manuscripts that deal with both.⁶⁷ Nevertheless, beyond this general division, the professional literature occasionally mentions more specific areas of specialization.

⁶⁶ A veterinary manuscript attributed to Aḥmad b. al-Ḥasan b. al-Aḥnaf that is preserved in the Dār al-Kutub library in Cairo, contains illustrations showing the treatment of various animals, including horses, oxen (zebus) and camels. See figures 17, 18, and 19.

⁶⁷ For example, one treatise provides evidence of the development of veterinary science and expansion of the veterinarian's role from the care of horses, giving it new meaning, similar to that of today. Thus, the veterinarian became responsible for the treatment of all types of animals without division into specializations. See Bodleian Library, Oxford, *Ms. Arab d. 208*.

1. *Specialization in Horses, Donkeys, Mules and Camels*

In a detailed chapter on horseshoes and the care of them, Abū Bakr makes a clear distinction between farriers (*ṣunnāʾ*) and professional veterinarians like himself and his father, who also shod horses.⁶⁸ He does, however, express respect for all those who deal with shoeing mules and donkeys, remarking that the mule was the sultan's vehicle when he traveled to distant places like Syria; therefore the veterinarian had to prepare special shoes that would withstand the rigors of such a long journey.⁶⁹ He devotes a section to the special shoes used for donkeys, rejecting the arguments of those who are disdainful of donkeys and the appropriate types of shoes for them. He explains that these are shoes of a very complicated type and there are very few craftsmen who are capable of making them. Indeed, the skill of a craftsman in this field is measured by his success in preparing shoes for donkeys.⁷⁰

In horse medicine we sometimes come across names of veterinarians who specialized in obstetrics, particularly in surgery when the foetus was in distress or if it was necessary to remove a dead fetus from the mare's womb. It is interesting to read in one of the veterinary treatises that a mare gave birth to a foal without the help of a midwife (*dāyah*).⁷¹ Abū Bakr's describes how his uncle treated a pregnant mare who belonged to one of the senior Mamluk emirs. During the birth, complications arose and it was hard to remove the dead foetus from her uterus. Usually, in a situation like this, the veterinarians had to intervene violently and insert their hands into the mare's womb, holding knives and scissors to cut the foetus to pieces and remove them. However, Abū Bakr's uncle, using a special tech-

⁶⁸ Another veterinary treatise, by al-Malik al-Mujāhid, does not make this distinction and states that shoeing horses is part of the veterinarian's job. al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 228; See figure 20, which shows a sixteenth-century veterinarian shoeing a horse. It is rare to find any mention of the names of people who dealt with the shoeing of horses. Previously in this book I mentioned Abū Bakr's sharp criticism of those who did not do their work properly and tried to save money by using unsuitable nails to attach the horseshoes, causing severe damage to the animals: Abū Bakr al-Baytār, *Kāshif*, vol. II, pp. 423, 427, 433.

⁶⁹ Abū Bakr al-Baytār, *Kāshif*, vol. II, p. 435.

⁷⁰ *Ibid.*, p. 435; B.L., Ms. ADD. 23,416. fol. 93r°.

⁷¹ Figure 44 shows the position of the foetus in the mare's uterus and a newborn foal standing on feet next to its mother. A manuscript in Paris attributed to Wahab b. Munabbih contains a section dealing with this subject and it also includes an illustration that clarifies the text: «صفة الحجر العشار وصفة كيفية المهر في جوفها والذي في وقت ولا دنهاله، وكيفية طلب الخروج من فرجها بلا». See: *كتاب في علم سياسة الخيل* لوهب بن منبه. B.N., Ms. Arabe 2817, (Suppl. ar. n° .993), fols. 17v°-18r°; Abū Bakr al-Baytār, *Kāshif*, vol. II, p. 319.

nique, succeeded in causing the mare to eject the dead foetus without him having to cut it up, and thus he saved the life of the mother. Abū Bakr mentions that his brother took part in this treatment, and apparently also shared this specialization.⁷²

The training of horses was of utmost importance in the Mamluk period, involving various specializations according to the designated role of the horse. A person who specialized in training horses was called *sā'is* or *rā'id al-khayl*.⁷³ The tasks imposed on a horse that was designated to take part in ceremonial processions or to be ridden by the sultan differed from the tasks of a warhorse, a hunting horse or race horse, and for each of these purposes a skilled expert was required. The preparation of horses for racing, known as *idmār al-khayl*, is discussed at length in veterinary sources.⁷⁴ Abū Bakr devotes a separate section to this subject, in which he describes the most suitable horse for this purpose and also refers to the optimal times for training, the appropriate kinds of food for making the horse lose weight without starving, special exercises that cause the horse to sweat and become thinner, the different distances for races, and so forth. He also refers to the rider in the race (like a modern jockey), *al-sawwāq*, meaning 'the leader'. The *sawwāq*'s weight was of critical importance for winning in a horse race, in addition to his skills in riding and guiding the galloping horse in the hippodrome.⁷⁵

Hippology, which involved training horses for riding or other tasks, was apparently the responsibility of the court veterinarian, but outside the court it appears to have been a separate profession and those who practised it did not engage in medical treatment, although it included certain ele-

⁷² *Ibid.*, vol. II, pp. 317-319.

⁷³ Al-Malik al-Mujāhid speaks of this role, referring to the *rā'id* as someone who is an expert in horsemanship and capable of dealing with severe behaviour problems of horses, like that of a horse who is *ḥarrān*—wild and undisciplined when ridden. He recommends giving it to a *rā'id*, an expert horseman, to be tamed. See al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 226; see figure 17 for a depiction of horse taming.

⁷⁴ The word *idmār* comes from the verb *ḍamara*, meaning to lose weight and become thin. This term was widely used in the context of treatment of horses, in the sense of preparing the horse for races by slimming it down. The sources state that it took 40 days, during which they first caused the horse to gain weight by keeping it tied to one place and serving it large quantities of food and drink. After this they decreased the quantities of food and drink and simultaneously gave it strenuous exercise that made it sweat and gain in fitness. Al-Dimyātī, the author of an important book on horses, discusses this subject at length. He also gives a detailed linguistic explanation of the word *idmār* or *ṭadmīr* (—*تضمير*—). (تقلل علفها مدةً وادخالها بيتاً . . .). See Bodl. L., *Ms. Marsh* 389, fols. 83r^o-83v^o. See also another manuscript, B.L., *Ms. ADD.* 23,416, fol. 82r^o.

⁷⁵ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, pp. 167-173.

ments of treatment, particularly the treatment of horses' behavioural problems. This specialization is often discussed in professional veterinary treatises.⁷⁶ For example, we find discussions on the treatment of horses that resisted being mounted, as well as lengthy descriptions of behaviour problems that the veterinarian or the trainer had to deal with. These trainers were perhaps the major group in the sultan's service, since the horses they trained carried the sultan and the other Mamluk emirs. They had to be highly proficient in dealing with everyday problems of horses as well as training new horses for a variety of uses, such as hunting, battle, polo games, processions, or work in the service of the state, for instance, as post horses.

The training of animals for agricultural use, especially draft animals such as mules, donkeys and oxen, called for expert all-round veterinarians, and there were certainly doctors who worked as veterinarians in the general population, which was largely agrarian.⁷⁷

As stated, treating mules and donkeys was also part of the horse doctor's profession. Most of the treatises state that diseases that affect these animals are common to all draft animals (*dawāb*) including horses, and therefore the methods of treatment are similar. An exception to this was the treatment of camels, which was apparently a different area of expertise. The camel expert was called *jammāl*, from the Arabic word for camel.⁷⁸ Most of the camel experts were Bedouin, for whom the care of camels was part of their ancient tradition. However, veterinary treatises by two kings from the Rasūlid family that reigned in Yemen, al-Malik al-Mujāhid and al-Malik al-Ashraf, devote entire chapters to the care of camels. However, they also write that the veterinarian who treats horses also understands the treatment of camels.⁷⁹

The elephant handlers, *fayyālūn* (sing. *fayyāl*), were another group of specialists. The elephants in the Mamluk court arrived as gifts from rulers of different countries, mostly from India, but apparently some from Africa, too. The care of elephants required special skill, different from the skills

⁷⁶ See chapter VII, and figure 17.

⁷⁷ A veterinary treatise attributed to a 13th century author named Aḥmad b. al-Ḥasan al-Aḥnaf features some illustrations depicting the work of the veterinarian treating various animals. As well as horses he treats oxen (في علاج الثور المهزول) and camels with problems of hair loss (علاج الابل اذا تساقط شعره). See figures 18-19. See also above, pp. 179-180.

⁷⁸ Al-Malik al-Ashraf, *al-Mughnī fi al-baytarah*, pp. 198, 199, 204.

⁷⁹ *Ibid.*, pp. 169-209; al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, pp. 383-396. A veterinary treatise attributed to Aḥmad b. Ḥasan al-Aḥnaf (13th century) features drawings depicting a veterinarian dealing with problems of hair loss in camels, weakness and exhaustion among bulls, as well as treating various problems of horses. See figures 17-19.

needed for the care of other animals because elephants were rare or, in fact, non-existent throughout the Mamluk Empire. Clearly, the knowledge required was not possessed by Arab or Muslim veterinarians who worked anywhere in the empire, and the ongoing care and medical treatment of the elephants was entrusted, as already stated, to people originating from India. Presumably, a similar situation existed in the courts of Mamluk sultans in Egypt, and elephants sent as gifts from rulers in India came accompanied by professional elephant tamers and handlers.⁸⁰

An unusual specialization is that of snake experts. We learn about this from Mamluk chronicles referring to the role of the snake handler (*al-ḥāwī*)⁸¹ in Cairo's central hospital. This professional was very knowledgeable and his main task was presumably to remove the venom from the snakes' poison glands. We may assume that this job was connected with general medical treatment of humans, when certain types of venom derived from snakes were used to prepare theriaca (*tiryāq*), for healing purposes.⁸² The snake expert worked in Cairo's central hospital, together with doctors who treated humans, as we learn from an event reported by the Mamluk chronicler, Ibn Iyās, when the sultan gave orders for the snakes to be killed and cut to pieces in front of his eyes. It is not clear from Ibn Iyās's account what led the sultan to give such an order. The chronicler only remarks that on this occasion the sultan bestowed honor upon the head doctor, Shams

⁸⁰ Al-Maqrīzī refers to elephants that were in the service of the Indian sovereign, Sultan Muḥammad b. Ṭaghlaq Shāh Ghayyāth al-Dīn, whose seat of government was in Delhi. He enumerates some 3,000 elephants that were trained for battle in this ruler's army, each one bearing on its back six to ten soldiers. Al-Maqrīzī mentions that the 3,000 elephants had to be fed with huge amounts of food; and he estimates the quantity as 40 rotls (*ratls*) of rice, 60 rotls of barley, 20 rotls of oil (apparently for cooking rice) and half a *ḥaml* of fresh grass daily. He describes the formation of the army going to battle: the warhorses with their riders were deployed on both flanks, the elephants near the front with their riders, and in front of them the slaves, who were foot soldiers. Behind the elephants were the archers, and behind them the king. See al-Maqrīzī, *al-Khiṭaṭ*, vol. III, pp. 283-287.

⁸¹ Ibn Iyās, *Badā'i' al-zuhūr*, vol. III, p. 358.

⁸² Al-Jāhīz, discussing the profession of *al-ḥāwī*, mentions the extraction of poison from snakes. He refers to the expertise of these professionals, who originated from Sijistān. Elsewhere he refers to the effectiveness of drinking theriaca (*Tiryāq*) as an antidote to snake bites, saying that the optimal time is less than an hour or two after the bite, otherwise the treatment will not be effective. See al-Jāhīz, *Kitāb al-Ḥayawān*, vol. IV, pp. 51, 45-55, 68-69. Al-Damīrī cites a long list of uses of different parts of the snake's body for medical treatment, among them snakes' blood for eye treatment—kohl, snake oil for insect bites and hemorrhoids, snake skin for treatment of teeth, and so forth. Ibn al-Bayṭār, in his pharmacological book, also recommends the use of snake skin for various treatments. See al-Damīrī, *Ḥayāt al-Ḥayawān al-Kubrā*, vol. III, pp. 36-37.

al-Dīn al-Qūṣūnī, and gave him, his son, and the snake handler large sums of money.⁸³

There were also experts who worked with postal pigeons and trained them to deliver mail, as well as experts on exotic animals that were bred in the sultan's court—giraffes, lions, zebras, tigers, and more. Al-Malik al-Mujāhid writes, for example, that wild donkeys originated from Mogadishu in Somalia, from whence they were sent as gifts to the Rasūlīd court in Yemen. He describes a special type of wild donkey (presumably a zebra) with symmetrical black and white stripes on both sides of its body, adding that some of the females were tamed for riding and kept in the royal stables with the other riding animals.⁸⁴ He does not state whether these wild donkeys were cared for by the veterinarians who looked after the horses or whether they had arrived accompanied by experts from their country of origin, like the elephants who came with their keepers from India.

2. Specialization in Hunting Animals

The medical treatment of hunting animals was part of the occupation of the expert known as *bāzyār* [hawker/falconer]. This role demanded extensive medical knowledge including methods of diagnosing and treating diseases, and a considerable part of the work concerned nutrition and maintaining the good health of the hunting bird or animal—the *jawāriḥ*, which included not only birds of various types but also dogs, cheetahs, and sometimes even caracals, although hawks carried the highest status. These experts worked mainly in the service of the elite that could afford to indulge in hunting, an expensive sport that was beyond the means of the common people. It was mainly the sport of Mamluk sultans, many of whom are described in the sources as ardent hunting enthusiasts who devoted a great deal of their time to this activity.

Most of the late hawking/falconry treatises follow al-Ghaṭrīf's statement that four species of birds can be trained for hunting: the hawk—*bāzī*, the Peregrine—*shāhīn*, the Saker—*ṣaqr*, and the eagle—*ʿaqāb*. These four species are divided into 15 sub-species, each of which includes many varieties. Al-Ghaṭrīf describes in great detail the various species and sub-

⁸³ Ibn Iyās mentions the name of the doctor who headed the medical staff and was also the director of Cairo's central hospital (al-bīmāristān). See Ibn Iyās, *Badā'i' al-zuhūr*, vol. III, p. 358.

⁸⁴ Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 374.

species, referring to their natural habitat.⁸⁵ All the authors mention a species called *ṭughrul*, which is a kind of white falcon, a very expensive bird. Other sources refer to this bird as *sunqur* and claim that its origin is Turkey. We know from other sources that gyrfalcons were imported into Mamluk Egypt from Northern Europe, but the bird called *ṭughrul* is said to have originated from the Caspian Sea and Armenia.⁸⁶ These regions might have served as intermediary stations. The rarity of this bird placed it at the head of the hierarchy of hunting birds. Second in rank was the hawk (*bāzī*), third was the Peregrine (*shāhīn*), and the lowest of the four was the Saker (*ṣaqr*). Sometimes the order of the last two was reversed.

As we learn from various sources, the care of hunting birds and animals was divided between different groups of people, each of whom specialized in the treatment of a certain species. One early source that refers to these types of specialization is the biographical book of Usāmah Ibn Munqidh (d. in Damascus in 584/1188).⁸⁷ In describing one of his father's hunting trips, Usāmah distinguishes between two groups of specialists on hunting birds. The first group was known as hawkers (*bāzyār*, pl. *bayāzīrah*)—from the name of the bird (*bāz*) in which they specialized (including medical care)—most probably the goshawk (*Accipiter gentilis*).⁸⁸ These specialists

⁸⁵ Al-Ghaṭrīf, *Kitāb Ḍawārī al-ṭayr*, pp. 16-19.

⁸⁶ Ibn Mankalī, *Uns al-malā*, pp. 162-190; al-Baladī, *al-Kāfi fi al-bayzarah*, p. 65; al-Ghaṭrīf, *Kitāb Ḍawārī al-ṭayr*, pp. 16-19.

⁸⁷ Ibn Munqidh, *Kitāb al-I'tibār*, p. 125.

⁸⁸ There is considerable difficulty in identifying types of birds by their Arabic names. Al-Ghaṭrīf and Ibn Mankalī devote entire chapters to the identification of birds. See al-Ghaṭrīf, *The Book on Birds of Prey*, pp. 16-19, Ibn Mankalī, *Uns al-malā*, pp. 162-190. Several modern studies have been written on the names given to different types of birds and the difficulty of identifying them. These studies attempted to locate the various species known today and identify them by the names given to them in the early Arabic sources. In general, the results are unsatisfactory and the identification is not certain. See, for example, Möller, *Studien*, pp. 127-131. A series of articles published by Phillot, alone or together with Azoo, also deals with names. See: D.C. Phillott and R.F. Azoo, "Chapters on Hunting Dogs and Cheetahs, Being an Extract from the *Kitāb 'l-Bayzarah* [sic], a Treatise on Falconry, by Ibn (!) Kushājim, an Arab Writer of Tenth Century," *Journal and Proceedings of the Asiatic Society of Bengal* (N.S.), III/9 (1907), pp. 47-50; eadem, "On Hunting Dogs," pp. 599-600; eadem, "Some Birds and other Animals," pp. 139-143; eadem, "The Birds' Complaint before Solomon," pp. 173-178; eadem, "Things Which the Owners of Hawks Should Avoid," pp. 401-403; Phillott, "Indian Hawking-Gloves," *Journal and Proceedings of the Asiatic Society of Bengal* (N.S.), III, 9 (1907), pp. 603-605; idem, "Murgh-Nāma [sic]: Extract on Cocking ('Murgh-Nāma') from the 'Ṣayd-gāh-i Shawkat ī,' an Urdu Work on Sport Written by Nawāb Yār Muḥammad Khān of the Rāmpūr State, AD 1883, and two Appendices," *Journal and Proceedings of the Asiatic Society of Bengal* (N.S.), VI, 2 (1910), pp. 73-91; idem, "Note on Common Merlin (*Æsalon regulus*)," *Journal and Proceedings of the Asiatic Society of Bengal* (N.S.), III, 9 (1907), pp. 601-602; idem, "Note on Indian Hawk-Bells," *Journal and Proceedings of the Asiatic Society of*

were often called by the name of their profession; for example, Ibn Mankalī mentions the name Ḥamīd al-bāzyār.⁸⁹ The second group, known in Arabic as *ṣaqqārūn*, comprised experts on sakers (*Falco cherrug*). The sources often refer to hawkers and falconers by their particular specialization, such as *ṣāḥib al-bāzī*, meaning ‘the hawk master’, *ṣāḥib al-shāhīn* (master of the Peregrine), and so forth,⁹⁰ the assumption being that not every hawk or falconer mastered all the relevant techniques. The author of *Kitāb al-Wāthiqī* writes that the lowest level of hawkers/falconers is the *ṣāḥib al-ṣaqr*, or *ṣaqqār*, namely the one who only knows how to work with Saker s, which, apparently, is relatively easy to handle. Those who worked with goshawks and Peregrine s enjoyed a higher status,⁹¹ and the highest level was that of ‘master of the goshawk’ (*ṣāḥib al-bāshiq*), because only those who were familiar with all the secrets of the art of hunting with birds and had learnt to control the bird with great patience could succeed in working with this very sensitive hunting bird.⁹²

In some sources predating the Mamluk period it is stated that each of these groups of specialists was headed by a vizier, but in the period discussed here there is no evidence to support it. The only emir mentioned as responsible for the hunting bird under the Mamluks was the *amīr shakār*.⁹³

In general, every hawk or falcon had its own hawk/falconer. Sometimes a hawk/falconer was called a “bird player”—*al-laʿīb bi-al-jawāriḥ*—and some authors use this name when addressing falconers directly.⁹⁴ They distinguish between the person who does the hunting, whom they call the

Bengal (N.S.), III, 9 (1907), Note no. 60; idem, “Note on the Red-Headed Merlin (*Æsalon chicquera*),” *Journal and Proceedings of the Asiatic Society of Bengal* (N.S.), III, 6 (1907), pp. 395–399; idem, “Note on the Saker or Cherrug Falcon (*F. Cherrug*),” *Journal and Proceedings of the Asiatic Society of Bengal* (N.S.), III, 3 (1907), pp. 179–192; (Illustrations III and IV); idem, “Note on the Shahin Falcons (*Falco peregrinator* and *F. barbarus*, Blanford),” *Journal and Proceedings of the Asiatic Society of Bengal* (N.S.), III, 5 (1907), pp. 389–393; idem, “Vocabulary of Technical Falconry Terms in Urdu, Persian and Arabic,” *Journal and Proceedings of the Asiatic Society of Bengal* (N.S.), VI, 7 (1910), pp. 315–380.

⁸⁹ Ibn Mankalī, *Uns al-malā*, p. 212.

⁹⁰ Süleymaniye Kütüphanesi, Istanbul [hereafter S.K.], *Ms. Fatih 3566*, fols. 5v°, 7r°, B.L., *Ms. ADD. 23417*, fols. 3r°, 4r°, 158v°, 160r°.

⁹¹ In a marginal note, Möller writes that the word *bayāz*, which means treatment of the Saker, was not commonly used in the east but only in Spain. In the east they used the terms *ṣāḥib al-bāzī* or *ṣāḥib al-shāhīn*. See Möller *Studien*, p. 137.

⁹² S.K. *Ms. Fatih 3566*, fol. 5v°.

⁹³ On *amīr shakār*, see also al-Baladī, *al-Kāfi fī al-bayzarah*, p. 104; al-Qalqashandī, *Ṣubḥ al-Aʿshā*, vol. V, p. 461; al-Nāshirī, *Intihāz al-furaṣ*, p. 85.

⁹⁴ See S.K., *Fatih 3566*, fols. 7r°, 13r°. See also al-Baladī, *al-Kāfi fī al-bayzarah*, p. 122.

player, and the hawker or falconer, although the latter could also be called player, but the term usually refers to a king, an emir or someone else of high status who was a hunting enthusiast and went out hunting accompanied by the hawker/falconer.

The falconers employed in the court filled several roles relating to hunting; they took care of everything needed for the hawks/falcons, including the supply of food, and the tools and facilities required for their upkeep. The best hunting grounds in the kingdom were available to them for taming and training the birds, and for this purpose they had to prepare the ground, which involved excellent knowledge of the animals they set out to hunt. The ruler also employed a group of experts who were especially trained to seek out hawks' breeding places.⁹⁵

The expert bird keeper was expected above all to have extensive knowledge and sharp discernment concerning types of birds and their classification by species. The authors of hawking and falconry books devote long chapters to this question of classification into species, which became a significant part of the specialization of everyone in the field. These ornithological chapters describe each type separately, emphasizing the signs that distinguish between them.⁹⁶ It was not always easy to distinguish between the various types of hunting bird, especially in the case of types that were very similar. In addition, every specialist group was required to know the behavioural differences of each type, especially what kind of quarry or animal the hunting bird should be flown at, because a large number of persons participated in the hunt and flying a bird at the wrong kind of quarry could cost the bird its life and incur heavy punishment for its handler.

Mamluk sources also mention the role of assistant hawker/falconer, *ḥammāl*. Ibn Mankalī ascribes great importance to the rules of behaviour that were binding on the *ḥammāl*. These rules determined, for example, in which hand he held the hawk while riding on horseback, on which side of the mounted hawker he stood, and with which hand he took the hawk from him.⁹⁷ According to these sources, this man's role also included as-

⁹⁵ Usāmah Ibn Munqidh, *Kitāb al-I'tibār*, p. 200.

⁹⁶ Among the treatises that devote chapters to rules for identifying types of birds, see al-Baladī, *al-Kāfi fī al-bayzarah*, pp. 53-65; Ibn Mankalī, *Uns al-malā*, pp. 162-165, 168-181; Kushājim, *al-Maṣa'id wa-al-maṭā'irid*, pp. 49-85; al-Ghaṭrīf, *The Book on Birds of Prey—Kitāb Dawārī al-ṭayr*, pp. 16-19.

⁹⁷ Hawking and falconry writings attach importance to the question of which hand should be used to carry the hunting bird, and they generally determine that it should be

sisting the hawker in the ongoing care of the bird. One manuscript describes how the *ḥammāl* has to hold the hawk in his hand for hours in a bathhouse, as treatment against lice.⁹⁸

Another role connected with the falconer was that of *ghulām*, meaning falconer's apprentice. The sources differentiate between a falconer who trained the falcon himself and the *ghulām* or *kunddarah*. According to Ibn Qushtumur, the term *kunddarah* (or *kanddarah*)-perch, was applied to a hawker/falconer who did not know how to ride a horse holding a bird in his hand. He write that this person did not go out on the hunt but stayed in the hawks' or falcon's mews, but presumably, in reality he helped the hawker/falconer to tame the birds outside the court and also participated in the hunt. For example, during the hunt the apprentice had to approach a hawk that had caught an animal and kill it under the hawk's feet. In the court of Caliph al-ʿAzīz billāh in Cairo a good hawker/falconer's apprentice received a salary of two dinars a month, while an apprentice who was not so good received only one and a half dinars.⁹⁹

Experts on hunting dogs were called *kalābidhah* (sing. *kallāb*)¹⁰⁰ and they are often mentioned as a separate group that accompanied the sultan on hunts. Some of them specialized in saluki dogs, considered to be the noblest breed. As with thoroughbred horses they familiarized themselves with the pedigree of these dogs.¹⁰¹ Another breed of hunting dog was the *zighārīyah*, on which the Arabs of the *Jāhilīyah* period were reputed to be

the left hand. Therefore, the assistant hawker/falconer (*ḥammāl*), had to carry the bird in his right hand. See Ibn Mankalī, *Uns al-malā*, pp. 160-161; al-Damīrī, *Ḥayāt al-Ḥayawān al-kubrā*, vol. 1, p. 109; al-Asadī, *al-Jamharah*, p. 9; al-Nāshirī, *Intihāz al-furas*, p. 35; al-Ghaṭrīf, *The Book on Birds of Prey – Kitāb Ḍawārī al-ṭayr*, pp. 2-3; Kushājīm, *al-Maṣaʿid wa-al-maṭārid*, p. 49; al-Ḥasan b. al-Ḥusayn al-Bāzyār, *al-Bayzarah*, pp. 65-72. Al-Baladī remarks that the Egyptians (*ahl Miṣr*) broke this convention and carried the bird in the right hand, arguing that the right hand is stronger and the bird should be flown with greater force. He disagrees with the Egyptians, explaining that the bird might be injured by being flown with great force and even sustain serious damage such as dislocation of the hip or thigh. According to him, the bird should be flown gently with the left hand, emphasizing this had always been the practise since antiquity. Illustrations from early periods confirm al-Baladī's statement. See al-Baladī, *al-Kāfi fī al-bayzarah*, pp. 127-128; See figure 21—a marionette of a Mamluk shadow-theatre representing a mounted falconer holding a falcon or hawk on his left hand; see also figures 6-10 representing falconers from later periods.

⁹⁸ B.L., Ms. ADD. 23,417, fols. 37r^o-38v^o.

⁹⁹ Möller, *Studien*, p. 137.

¹⁰⁰ S.K., Ms. Fatih 3566, fol. 122r^o.

¹⁰¹ Aḥmad al-Ḥashshā' (attributed to), *al-Manṣūrī fī al-bayzarah*, ed. ʿAbd al-Ḥafīz Maṣṣūr, [published at *ʿMajallat al-Mashriq*, vol. II (Mars-April, 1968, year 62), p. 160; Kushājīm, *al-Maṣaʿid wa-al-maṭārid*, p. 131. On Saluki dogs that were used for hunting, see also B.L., Ms. ADD. 23,417, fols. 126v^o-132v^o; al-Nāshirī, *Intihāz al-furas*, p. 64.

great experts, and in Mamluk times there were also specialists who were appointed to train and take care of these dogs.¹⁰² There were also dogs that were born from the mating of these two breeds and were sometimes regarded as having more highly developed physical characteristics than the purebreds.¹⁰³ It may, however, be assumed that there were also dog handlers who specialized in other breeds of dogs as well.

During the hunt there was full cooperation between the dog handlers and the hawkers/falconers.¹⁰⁴ This was necessary in order to overcome the bird's natural fear of dogs. Therefore, hunting birds were trained together with dogs as a matter of necessity. The training of sakers called for full cooperation with dogs, because saluki dogs helped them to catch the quarry. Hence it was important for the dog to be present during the entire training process so that the saker could become accustomed to its presence, even during feeding.¹⁰⁵

Another specialization was that of the cheetah handlers, the *fahhādīyah* or *fahhādūn*.¹⁰⁶ These experts are usually mentioned in connection with hawkers or falconers. For example, an *amān*—a letter of patronage and protection from the Fāṭimid Caliph al-Ḥākim bi-Amr Allāh that was given to various groups of citizens mentions hawkers/falconers, cheetah handlers and partridge specialists (not much is known about the last. Supposedly they specialized in hunting partridges).¹⁰⁷

The main information we possess about the cheetah experts is the great difficulty involved in taming the females, which were generally the ones trained for hunting. We find lengthy descriptions devoted to the methods

¹⁰² Ibn Munqidh, *Kitāb al-I'tibār*, p. 201. Ibn Mankalī refers to these two breeds of dogs explaining that the saluki is associated with the town of *Salūqīyah* in Yemen, while the *zughārīyah* are associated with the town of Zaghūr, which was situated "in the Byzantine country in the Ṭayṭūq kingdom." See Ibn Mankalī, *Uns al-malā*, p. 99. There is, however, another opinion that associates the saluki with the town of *Selfkiya* in Asia Minor. See the editor's note in al-Baladī's hawking/falconry treatise. Al-Baladī, *al-Kāfi fī al-bayzarah*, p. 148 (note 1).

¹⁰³ Ibn Mankalī mentions the hybrid that is a cross between a saluki and the breed known as *zaghwānī*. This dog is regarded as being more longwinded than the purebreds and better for hunting ostriches. See Ibn Mankalī, *Uns al-malā*, p. 204.

¹⁰⁴ Cooperation between different animals was vital when hunting large birds. Ibn Mankalī describes an ostrich hunt that necessitated the participation of at least five or six Sakers, all attacking the ostrich together. He adds that a dog is also necessary for this kind of hunting. See *Ibid.*, p. 204.

¹⁰⁵ Al-Baladī, *al-Kāfi fī al-bayzarah*, p. 148.

¹⁰⁶ "وذكر العلماء الفهّادين": S.K., *Ms. Fatih* 3566, fol. 121r^o; B.L., *Ms. ADD.* 23,417, fols. 158v^o, 175r^o.

¹⁰⁷ Al-Maqrīzī, *al-Khiṭaṭ*, vol. III, p. 33.

of catching them and the physical and mental skills required in order to overpower and subdue this wild beast and train it for hunting.¹⁰⁸ Ibn Mankalī devotes an entire chapter to the differences between types of cheetahs, remarking that it is incumbent on the cheetah handler and tamer (the *fahhād*) to know the various types of cheetahs that come from many different areas, because each of them has to be treated in a different way.¹⁰⁹ Sometimes special skill was needed to distinguish between a cheetah and a leopard; thus, Usāmah b. Munqidh relates that when he visited the town of Haifa, one of the Franks attempted to sell him a young leopard (*nimr*) that he had raised in his house, claiming that it was a cheetah (*fahd*).¹¹⁰ Like the cooperation between dog handlers and hawkers/falconers, the cheetah handlers were also expected to cooperate with the other specialists, particularly in the matter of medical treatment, which will be elaborated upon later. Generally, similar treatments were used for dogs and cheetahs, indicating the close professional link between these two groups of experts.¹¹¹ The major difficulty was the training of the cheetah to ride on horseback during the hunt, which required endless patience on the part of the trainer (and the horse, of course). If the training was successful the *fahhād* received great honor.¹¹²

The story of one female cheetah who lived in the court of Usāmah b. Munqidh's father is a striking example of the difficulties involved in training cheetahs. As soon as she was caught the taming process was begun by an expert who was in charge of the cheetahs at the court. He attempted to subdue her and make her obey his orders, but without much success; she refused to chase the quarry although he managed to train her to ride a horse. Usāmah relates that the cheetah suffered from epileptic fits and would froth at the mouth like humans suffering from this condition. She behaved strangely whenever the trainer brought her food; instead of devouring it voraciously like other cheetahs, she would hold the meat between her teeth, examining it and smelling it for a long time before starting to chew it. This strange behaviour continued for almost a year

¹⁰⁸ Ibn Mankalī describes in detail the catching of the cheetah and the process of taming it and making it amenable. Ibn Mankalī, *Uns al-malā*, pp. 124-129. See above, chapter I, section C-iv.

¹⁰⁹ *Ibid.*, 129-134.

¹¹⁰ Ibn Munqidh, *Kitāb al-I'tibār*, p. 111.

¹¹¹ One example of this can be found in the description of a disease that affects paws (*kaff al-kalb aw al-fahd*), for which some sources recommend identical treatment for dogs and cheetahs "دواء لحفاء الكلاب والفهود." See S.K., *Ms. Fatih* 3566, fol. 121v^o.

¹¹² Ibn Mankalī, *Uns al-malā*, pp. 127-128. See also figures 11-12.

until one day, when Usāmah was out with the hunting party in a mountainous area full of ravines, the horses went into one of the ravines and stood at its entrance along with the cheetah and her trainer. Suddenly, a deer came out of the ravine running straight at him. Usāmah quickly drove back the deer with the help of his horse to prevent it from escaping. The horse struck the deer in the chest and knocked it down on the ground; the cheetah leaped toward the deer and caught it. She behaved as if she had finally awoken from a long sleep, and from that moment when she tasted the experience of hunting, she became the best deer hunter of all the cheetahs in the court. She was so eager to chase deer that no trainer could stop her when she caught sight of one in the hunting grounds. She would leap toward it, come to a standstill before the attack after the manner of cheetahs in the wild, and continue chasing it until she caught it. Usāmah writes of the status and prestige this cheetah enjoyed. Unlike the other cheetahs in the court, she had a special place to sleep in and a servant to take care of her needs. This cheetah's kennel, which was located near the palace, had a velvet carpet spread over the layer of hay covering the ground. Set in the wall next to the kennel was an iron ring to which she was tied with a strap after returning from the hunt. Usāmah describes the special relationship that developed between the cheetah and her female keeper, noting that the latter would take walks with the cheetah, comb its fur and stroke it, without any resistance on the animal's part. His description portrays a soft and gentle pet that offers no threat. This intimate relationship was not disrupted even by anger, writes Usāmah, describing an incident when the cheetah urinated on the velvet carpet and was punished by the angry maid, who shook her and even smacked her hard. To Usāmah's surprise, the cheetah was totally submissive and took the punishment without growling or baring her teeth.¹¹³

It should be emphasized that most *bayzarah* writings that deal with hunting animals such as cheetahs do not discuss the care of horses. Nevertheless, it is interesting to read of the interaction between the horse and the cheetah. Whereas in *bayzarah* books the descriptions mostly refer to the difficulty of training cheetahs to ride horses, *bayṭarah* books, which mainly deal with horses, suggest using a cheetah riding on the horse as a method of taming a particularly stubborn horse that refuses to be ridden by people.¹¹⁴

¹¹³ Ibn Munqī, *Kitāb al-I'tibār*, pp. 207-208.

¹¹⁴ Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 226. See also figure 11.

As already suggested, there were presumably exchanges of medical and zoological information between groups of specialists, particularly between groups that worked together and even under the authority of one ruler. We may also assume that information exchanges of this kind took place between each individual group and its counterpart that served a different ruler, even in a different country. Information on the treatment of animals was certainly exchanged between different countries, sometimes in connection with exchanges of gifts between rulers. Due to the Mamluk sultans' great love of hunting, hawking and falconry, they received gifts of hunting birds from distant countries. For example, one Mamluk ruler received a gift of gyrfalcons, which arrived together with a group of experts, that is, with their own falconers.¹¹⁵

Sometimes a certain ethnic group is credited with expertise in a particular type of hunting bird; for example, Ibn Mankalī attributes to the Kurds' expertise in certain types of hawks, which he names according to the towns or regions where they are prevalent,¹¹⁶ although he refutes the argument that the Franks and Byzantines are more adept than the Muslims in hunting with a special sort of Peregrine, known as *Kūhī*.¹¹⁷

Exotic animals from India and Africa were also welcomed, and the delegation that came with them usually included experts in the care of these animals. It is not clear whether these experts remained to serve in the court of the Mamluk sultans or trained those working in the court and then returned to their homeland. Mention has already been made of one group of experts who came to Yemen from India and settled in the court of the Rasūlīd king.¹¹⁸

D. SITES OF ACTIVITY

Our sources barely mention the places where veterinarians were active, and most of our information in this regard is based on the logical link be-

¹¹⁵ In 1317 CE the Mamluk Sultan al-Nāṣir Muḥammad Ibn Qalāwūn purchased 419 gyrfalcons, 107 of them from a Venetian merchant. Altogether, he paid the sum of 300,000 dirhams. See Ibn al-Dawādārī, *al-Durr al-fākhir*, p. 294 (ed. H. Roemer, Cairo, 1960). See also Ibn Shākir al-Kutubī, *Fawāt al-wafayāt*, Beirut, 1933, vol. II, pp. 86-89.

وأما البزاة الدربندية والشرويني والأنجاري والجكوري . . . وأكثر ما يقع في بلاد العجم مماليي همذان" إلى الموصل وإلى مراغة . . . وأكثر ما تقع هذه الأجناس في بلاد الجزيرة إلى خلاط وبلاد هكاري تصيدها الأكراد وتربيتها وتبقى عندهم كثيراً: Ibn Mankalī, *Uns al-malā*, pp. 164-165.

¹¹⁷ *Ibid.*, pp. 169-170.

¹¹⁸ See above, chapter II, section C, pp. 96-97.

tween the material that appears in the professional literature and the extensive evidence on the medical treatment of animals that appears in various other sources.

1. *The Sultan's Stables*

The royal stables described in Mamluk sources in no way resemble our image of stables today. The Mamluk sultan's stables in Cairo, which were under the responsibility of the *amīr akhūr*, did not consist solely of places for the horses to rest but also included houses that accommodated the animal keepers. Sometimes, a palace for the sultan's use was located within the stable compound. One such, for example, stood in the stables known as *Iṣṭabl Qūṣūn*, which was located next to Sultan Ḥasan's school (*maḍrasah*) in Cairo. Two large gates provided access to these stables; the first gate led directly into the sultan's stables, and from there the second gate led into the castle, where the sultan resided. When the place was later expanded to serve as stables for the horses of Sultan al-Malik al-Nāṣir Muḥammad Ibn Qalāwūn (d. 1341), it encompassed several buildings and became a sumptuous palace in which the emir Qūṣūn lived until the death of his patron, the aforesaid sultan.¹¹⁹

Control of the royal stables could sometimes be a matter of national importance, and a first step towards gaining control of the entire kingdom. An example of this is the first *Burjī* (or Circassian) Mamluk sultan, al-Malik al-Ẓāhir Abū Saʿīd Barqūq b. Unṣ (ruled: 1382-1389; 1390-1399), whose campaign to overthrow Sultan Ḥāji, the last of the *Baḥrī* sultans, and accede to the throne in Egypt and Syria started, according to the sources, with his gaining control of the ruler's stables in Damascus, and from there his way to the throne in Egypt was nearly assured.¹²⁰

2. *Hippodromes*

The hippodrome was the main site where the recreational activities and public ceremonies of the Mamluks took place. It was used both for training and for *furūsīyah* contests, including polo games and horse races, which

¹¹⁹ Al-Maqrīzī, *al-Khiṭaṭ*, vol. III, pp. 116-118.

¹²⁰ This took place on Sunday, the 13th of *Rabīʿ al-Ākhir* 799 (1377 CE). He even lived in these stables until the sultan was finally ousted on Wednesday the 19th of *Ramaḍān* 784. This means that the safest place in Damascus was the governor's stables, and there Barqūq entrenched himself and, needless to say, took possession of the horses, which were, in fact, the Mamluk ruler's most important war weapons. Barqūq remained in these stables for five years until he finally seized the entire kingdom. See al-Maqrīzī, *al-Khiṭaṭ*, vol. III, p. 392.

became a regular practise among the Mamluk emirs and their soldiers. In addition to horsemanship, the hippodromes also served for festive processions displaying the glory of the Mamluk sultans and their attendant emirs. Al-Maqrīzī, in his comprehensive book on Cairo, devotes an entire chapter to the hippodromes, most of which were located in Cairo and its vicinity and served the Mamluks for a variety of purposes.¹²¹

Some hippodromes that had been built in Egypt under the Tulunid and Ikshidid rulers continued to be used during the Mamluk period.¹²² Others were added by several Mamluk sultans. In 666/1267, Sultan Baybars built a hippodrome at the foot of *Jabal al-Aḥmar* (the Red Mountain), below the Cairo fortress. It was known as the ‘gourd game’ hippodrome (*Mīdān al-Qabaq*). Other names given to the same site were the Horse Race Hippodrome (*Mīdān al-sibāq*), the Feast Hippodrome (*Mīdān al-‘id*), named for the religious celebrations held there and also the Black Hippodrome (*Mīdān al-Aswad*), due to the black colour of its earth. It contained a royal platform and became the main site for processions, horse races, polo games and *furūsiyah* exercises. The sultan enjoyed watching these games and awarded prizes to the winners. At a later stage, the huge size of this hippodrome and its location in an area that was free of buildings made it the ideal place for drilling the army of Sultan al-Nāṣir Muḥammad b. Qalāwūn.¹²³

In 695/1295, Sultan al-Malik al-‘Ādil built the so-called Elephant’s Pool Hippodrome (*Mīdān birkat al-fīl*) in a location that had previously housed the sultan’s stables. It was used until the times of Sultan al-Nāṣir Muḥammad b. Qalāwūn, who transformed it again into stables in 717/1317. Al-Maqrīzī (d. 845/1441) notes that it still served as stables during his times.¹²⁴

Several hippodromes were built under Sultan al-Nāṣir Muḥammad b. Qalāwūn, known for his many building activities as well as for his fondness of horses. The most important one, which was also the biggest hippodrome built in the Mamluk period, was known as al-Mīdān al-Nāṣirī, after its founder, or ‘The Great Hippodrome’ (*al-Mīdān al-kabīr*).¹²⁵ It was surrounded by a stone wall, which gave it special grandeur. It had wells dug in it, with pulleys to draw up the water, special drinking fountains, and palm trees. Al-Maqrīzī remarks that this hippodrome was built in an area

¹²¹ *Ibid.*, pp. 320–326. On the hippodromes of Cairo and their architectural design, see Ayalon, “Notes,” pp. 31–62.

¹²² Al-Maqrīzī, *al-Khiṭaṭ*, vol. III, pp. 320–322.

¹²³ Al-Maqrīzī, *al-Khiṭaṭ*, vol. III, pp. 180–183, Ayalon, “Notes,” pp. 38–39.

¹²⁴ Al-Maqrīzī, *al-Khiṭaṭ*, vol. III, pp. 322–323.

¹²⁵ The sources differ as to whether this hippodrome was built in 712/1312 or 713/1313. See Ayalon, “Notes,” p. 40.

that had previously been Bustān al-Khashshāb, situated between Fustāt and Cairo. Polo matches were first held there in 718/1318. The sultan used to ride on horseback during the polo games, which were held on Saturdays for two months after the rising of the Nile. In this place the sultan also used to distribute the horses to the various emirs under his command as part of the customary Mamluk payment system.¹²⁶ After the period of Sultan Barqūq (784-801/1382-1398), this hippodrome was abandoned and became a camping place for pilgrims from the Maghreb. Sultan al-Mu'ayyad al-Shaykh (815-824/1412-1421) had it renovated and restored it as a place for polo games.¹²⁷

A second hippodrome, also built by Sultan al-Nāṣir Muḥammad b. Qalāwūn, was the 'Colts Hippodrome' (*Mīdān al-mahārī*), inaugurated in 720/1320 near the aqueduct *qanaṭir al-sibā'* to the west of the Nile bay. Horse breeding was also carried on in this place until the times of Sultan Barqūq, in 801/1398-9.¹²⁸

What appears to be a third hippodrome built by the same sultan is the one begun in 722/1322, which also included sheltered areas for horses and camels. This one was intended not only for the sultan himself but also for one of the senior emirs, named Buktumur al-Sāqī. It is claimed that two thousand workers were employed in this project, with 100 pairs of oxen to help them. When the project was completed the sultan made his first visit to the place and gave orders to add a special mating area for the horses. This site soon became a regular venue of the sultan and also of many other sultans because of its reputation as a good place for hunting cranes.¹²⁹

Finally, between 723-725/1323-1324-5, Sultan al-Nāṣir Muḥammad b. Qalāwūn built a fourth hippodrome, known as 'The Siryāqūs Hippodrome'. It also included palaces and gardens. Until 799/1396-7, games and ceremonies that took place there followed those held in 'The Great Hippodrome'.¹³⁰

Ibn Taghrī Birdī (d. 874/1470) mentions Barqūq (1382-1399) as the sultan who abolished the practise of horseback riding in hippodromes.¹³¹ This assertion contradicts the above-mentioned testimony by al-Maqrīzī concerning the resumption of such activities under Sultan al-Mu'ayyad al-Shaykh. It is of course possible that after the rule of Sultan al-Mu'ayyad

¹²⁶ Al-Maqrīzī, *al-Khiṭaṭ*, vol. III, p. 326.

¹²⁷ *Ibid.*, pp. 325-326.

¹²⁸ *Ibid.*, pp. 323-324.

¹²⁹ *Ibid.*, p. 266.

¹³⁰ *Ibid.*, 324.

¹³¹ Ibn Taghrī Birdī describes this as a practise worthy of retaining. See Ibn Taghrī Birdī, *Hawāḍith*, vol. II, p. 340.

al-Shaykh, the activities in the hippodromes fell into decline again. Sultan Qānṣūh al-Ghawrī (1501-1516) was apparently the last Circassian sultan who built a hippodrome in his name. Begun in 909/1503, it was located near Qal'ah Castle, and cost the huge sum of 80,000 dinars. Like al-Nāṣirī's hippodrome, it was surrounded by a high wall, and part of it was paved with chiseled stones (*naqqārah*). A high balcony was constructed on the west side, for the sultan and his party to view the polo games. The hippodrome area also contained a large artificial lake, and gardens planted with fruit trees, aromatic herbs and flowers. The water was propelled by water wheels from the fortress near the gate of the large cemetery and from other sources. As in hippodromes of the Roman period, there was a large gate in the wall reinforced with iron and flanked on either side by two small gates.¹³² A paved path led directly from the palace in the fortress to some special steps leading into the hippodrome, which also contained a small building designed for the sultan to rest, a drinking fountain, a pool, a place to wash before prayers, and even a special place for washing the dead prior to burial.¹³³

In view of the manifold activities involving the use of horses and other animals that took place in the hippodromes and in the stables and breeding sites adjacent to them, it is quite obvious that veterinarians were active there on regular basis.

3. *Housing Hunting Animals and Their Keepers*

The everyday treatment of hunting animals and their care before and after the hunt, was carried out in the court and also in special areas outside the court reserved for the hawkers/falconers. Due to the sensitivity of the hunting birds, the professional literature emphasizes the importance of providing a suitable and clean sleeping place.¹³⁴ The hardest and most critical period for the upkeep and protection of the hunting birds was the moulting season, *qarnaṣah*. This took place over a period of up to 40 days, during

¹³² Al-Maqrīzī, *al-Khiṭaṭ*, vol. II, pp. 28-30, 106.

¹³³ This description of the many auxiliary structures inside the hippodrome reflects the broad use of the hippodrome in addition to its basic purpose as a place for *furūṣīyah* games and horse races. The inclusion of a place for bathing the dead prior to burial testifies to the fact that the Mamluks held prayers for the dead and conducted funerals within the hippodrome. The proximity of the hippodrome to the great cemetery where many of the high-ranking Mamluks were buried, including many sultans and their families, supports this assumption.

¹³⁴ Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 342.

which close daily care was necessary.¹³⁵ The other animals—dogs, cheetahs and horses—required less attention while they were resting.

We learn from various sources that large numbers of falconers and others employed in hunting accompanied the sultan on the hunt, and it is feasible to assume that there was a need to provide them with suitable living quarters outside the court where they could practise their occupation daily, as required by this specialization.¹³⁶ Al-Maqrīzī mentions several places in Cairo that were connected with animals such as hawks, cheetahs, and horses. These were generally quarters of the city inhabited by people who trained and raised hunting animals. One such was the hawkers' quarter, *Rab' al-bazādirah*, situated at the foot of the Qal'at al-jabal fortress near to the horse market.¹³⁷ According to al-Maqrīzī, this quarter was established by order of the sultan after 713/1313, in a non-built-up area. At first, it consisted of a few houses, and then the Mamluk soldiers who built the place leased two fruit groves nearby, until they reached the grave of Shajarat al-Durr (ruled 1250), near to the dwellings of the Caliphs who had lived there in the past.¹³⁸

Another neighborhood in Cairo, also known as the hawkers' quarter, was *Hārat al-bayāzirah*,¹³⁹ situated outside Bāb al-Qanṭarah, near al-Khalīj, a cove in the river Nile that was used as a mooring for boats. This neighborhood, which was built during the reign of the tenth Fāṭimid Caliph, al-Āmir bi-Aḥkām Allāh (495-525/1101-1130), overlooked the cove near the fruit grove of Mukhtār al-Ṣaqlabī, whose name was changed to Ibn Ṣayram. Concerning the motives for building this neighborhood, al-Maqrīzī writes that the man responsible for the hunting birds, known in that period as *zammām al-bayāzirah*, complained to the ruler of the small space at his disposal for keeping and training the ruler's hunting birds. He requested permission for the hawkers/falconers to build a new neighborhood for themselves outside the city walls and near the bay in the river, which was essential for the birds and the other hunting animals. The Fāṭimid ruler acceded to their request, and the hawkers and falconers established a new neighborhood in this area, building houses overlooking the water.¹⁴⁰ This place was ap-

¹³⁵ *Ibid.*, p. 361; Ibn Qushtumur, *al-Qānūn al-Wāḍiḥ*, Köprülü Kütüphanesi, Istanbul, Ms. 978, fols. 69v^o-70r^o.

¹³⁶ Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 121.

¹³⁷ Al-Maqrīzī, *al-Khiṭaṭ*, vol. III, p. 219.

¹³⁸ The queen who ruled Egypt at the end of the Ayyubid period and transferred the throne to the Mamluks.

¹³⁹ Al-Maqrīzī, *al-Khiṭaṭ*, vol. III, pp. 31-32, 221.

¹⁴⁰ *Ibid.*, pp. 31-32.

parently chosen because it was surrounded by areas rich in water and vegetation.

Though employed by the sultan, these hawkers and falconers did not live in the court. Their request to live outside the city can be understood as an attempt to keep the birds in an area that would be more suitable to their natural preferences. Presumably wide open spaces were also necessary for the taming and training of animals.

4. Markets

i. *The Horse Market and Other Big Animals' Markets*

Horse markets must have constituted an important component of every Mamluk city. In Cairo, the horse market was situated to the west of the hippodrome, not far from the citadel (*qal'ah*). It was under the supervision of the *Dīwān al-wazārah*, which is described as the highest administrative department of the Mamluk sultanate.¹⁴¹ The inclusion of special chapter of the *Ḥisbah* treatises related to controlling the activities of veterinarians, points to the horse market as one of the main sites in which veterinarians exercised their profession. We also learn of the presence of veterinarians in the horse market from a description of the veterinarian's role in the professional sources, which state that it is the veterinarian's duty to provide a professional opinion on the horses that are offered for sale, since he is the person most qualified to examine the state of health of the horse at the time of purchase. This opinion included determining the age of the horse and looking for hidden defects that the layman could not detect.¹⁴² One veterinary book mentions the fact that veterinarians also treated the horses of passers-by.¹⁴³ Evidently markets, particularly the horse market, were considered among the most suitable places for this activity.

Horses mainly served the Mamluks, but in Cairo there were other markets that specialized in the trade in other big animals. The camel market (also supervised by the *Dīwān al-wazārah*, an indication for its importance

¹⁴¹ *Ibid.*, pp. 333, 375; On the *dīwān al-wazārah*, see al-Qalqashandī, *Subḥ al-ʿaʿshā*, vol. VI, p. 199. Beside its commercial functions, a horse market could occasionally serve for other purposes, such as public executions. See, for instance, the execution in 716/1316 of a certain ʿUthmān who had rebelled against the Mamluk sultan in the horse market of Hamat. Abū al-Fidā, *al-Mukhtaṣar*, vol. IV, p. 57.

¹⁴² Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 109.

¹⁴³ B.L., *Ms. ADD. 23,476*, fol. 129v°.

for the Mamluks),¹⁴⁴ and the cattle and sheep market are also mentioned in the sources, and, though no reference has hitherto been found in this regard, it can be surmised that veterinarians were active there as well.¹⁴⁵

Archival documents on papyri, dealing with the sale and purchase of animals, especially donkeys, mules and horses, attest to the high value of these animals. The very requirement to have a notarized contract signed by two witnesses to the transaction also testifies to the importance of such transactions. The clauses of the contract enabled the suspension of the deal for three days or the cancellation of the transaction after the animal's examination by a professional veterinarian who was expected to establish whether there were any defects or diseases that were hidden by cauterizing or the like.¹⁴⁶

ii. *The Bird Market*

In this market not only hens and geese were sold but also songbirds of many different kinds. Al-Maqrīzī describes a market stall where they sold songbirds to people who would then release them in the belief that it was a good deed for which they would be rewarded on the Day of Judgment. This practise originated from the popular belief that the bird released from the cage would praise God with its song, thus guaranteeing that the person who freed it would go to heaven. Al-Maqrīzī relates that the practise of releasing birds was especially common on Friday mornings before the midday prayer, when a good deed was believed to be most effective. He enumerates a number of birds that were sold in the market, such as turtle-doves, nightingales, blackbirds, parrots and quails, noting that quails were sold at a high price, up to hundreds of dirhams. He writes that the owners of songbirds would hold contests and the price of the bird was measured by its singing talents and strong voice. A bird that won the song contest could sell for as much as a thousand dirhams.¹⁴⁷

Al-Maqrīzī also writes of Mamluk bird lovers, *al-ṭawāshīyah*, whose wealth enabled them to buy the most expensive birds (quails) and even to

¹⁴⁴ Al-Maqrīzī, *al-Khiṭaṭ*, vol. III, p. 375.

¹⁴⁵ *Ibid.*, vol. III, p. 211.

¹⁴⁶ On contracts for sale of animals, see Yūsuf Rāḡib [sic], *Actes de vente d'esclaves et d'animaux d'Égypte médiévale*, Institut Français d'Archéologie Orientale [Cahier des Annales Islamologiques 23], Le Caire, 2002, pp. 43-79; Āmāl al-'Umārī, "Dirāsah li-ba'ḍ wathā'iq tata'allaq bi-bay' wa-shirā' khuyūl min al-'aṣr al-Mamlūkī," *Majalat ma'had al-makhtūṭāt al-'arabīyah*, vol. X (2) (Rajab 1384/Nov. 1964), pp. 241, 244-245, 248-249.

¹⁴⁷ "أصناف الطّاري والهزّارات والشّحاريّ والبغا والسّمّان": al-Maqrīzī, *al-Khiṭaṭ*, vol. III, pp. 156-157.

decorate their cages lavishly. One sum mentioned in this context is 1,000 silver dirhams, which was equivalent to 50 gold dinars, a very high sum in that period. This price was paid because of the special voice of this bird, which is described as singing a lyrical rhythm or a certain song. The more unusual the bird's style of singing and the higher its voice, the higher its price in the market. According to al-Maqrīzī, many people engaged in this sport and learnt how to take care of these birds, which were in great demand.¹⁴⁸ There appears to be no explicit evidence that doctors treated these birds, but in view of the birds' high price, this possibility should not be excluded.

iii. *The Meat Roasters' Market*

According to al-Maqrīzī, this market was the first one established in Cairo, in 356/966, during the period of the Fāṭimid Caliph al-Mu'izz li-Dīn Allāh. Its original name was *sūq al-sharā'ihiyīn* (the sellers of cut meat), and it was changed to the meat roasters' market around the year 700/1300, when a large group of people who dealt in roast meat came to live there.

The *Ḥisbah* treatises insist on the inspection of the freshness of the meat on sale in the markets, whether sold raw in the butchers' shops or cooked, fried or roasted.¹⁴⁹ According to these sources, the inspector of markets, the *muḥtasib*, appointed an official to examine every kind of meat that was sold in the market, and that this official's training could have included veterinary materials.

5. *The Battlefield*

The presence of veterinarians was necessary in the battlefield in order to treat injured horses. This treatment during wars must have been crucial, since the horse was the major tool of combat. Although there is no explicit evidence of the presence of veterinarians on the battlefield, literary sources indicate their presence in wars from ancient times, such as the story of Alexander the Great, who asked Hippocrates for help when his horses were struck by a plague. Even if this is a legend, the importance of veterinarians at the scene of battle is clear. In the Mamluk period when battles were

¹⁴⁸ *Ibid.*, vol. III, p. 156.

¹⁴⁹ A 14th century book by Ibn al-Ukhūwah details the types of meat on sale in the market. Among these we find roast meat, sausages, different forms of cooked meat mixed with vegetables, and more. The writer emphasizes particularly the inspection of butchers, because of the rules of purity pertaining to meat in Islamic law. See Ibn al-Ukhūwah, *Ma'ālim al-qurbā*, pp. 92-111.

waged between mounted fighters the likelihood of horses being injured was considerable. Indeed, veterinary treatises of the period deal with injuries sustained by horses in the battlefield and they describe methods of treating horses wounded by various weapons such as spears, swords, arrows, burning substances thrown at them, and so forth.¹⁵⁰

Some sources from the Mamluk period describe hunting trips as activities associated with military campaigns, generally in Syria. Some of the chroniclers mention in passing that Mamluk rulers, when embarking on war to conquer a city or suppress a revolt in their territories, went hunting before or after the campaign. Likewise, when they went to visit strategic places in the kingdom, to restore order or suppress a revolt in a certain region, the Mamluk rulers and senior army commanders took advantage of the opportunity to engage in their favorite sport. Clearly, then, people who worked with animals, whether veterinarians who treated horses wounded in battle, or hawkers/falconers and the other groups described above, would be needed on these expeditions. Abū al-Fidā' describes how the Syrian governor, the emir Sayf al-Dīn Tankiz, set out with his army for Qal'at Ja'bar, a fortress in Syria, to examine the state of its maintenance and check whether it could serve as a defense against attacking forces, and while there he took the opportunity to go hunting in the area.¹⁵¹ A visit to one of the fortresses could hold unexpected danger, as we learn from the account of the collapse of the drawbridge of Karak castle in Jordan, during the visit of Sultan al-Nāṣir Muḥammad Ibn Qalāwūn. The incident ended without injury to the sultan himself, thanks to his horse who sensed the danger and galloped quickly over the collapsing bridge, but some of the Mamluks and their horses fell into the moat. According to the account, the sultan himself hurried to save those who fell, and presumably a veterinarian would need to be present to treat the injured horses.¹⁵²

6. Hunting Grounds

The hunting ground was one of the major work sites of all the hunting assistants, and their presence on the scene was needed in order to ensure

¹⁵⁰ E. g. Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 143-145; al-Sāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. II, p. 209.

¹⁵¹ Abū al-Fidā', *al-Mukhtaṣar*, vol. IV, pp. 106, 136; Ibn Tighrī Birdī, *al-Nujūm al-zāhirah*, vol. IX, pp. 75, 131.

¹⁵² For the full account of the collapse of the bridge during the visit of Sultan al-Nāṣir Muḥammad Ibn Qalāwūn, see Ibn Ḥajar al-'Asqalānī, *al-Durar al-kāminah*, vol. IV, p. 146; Ibn Duqmāq, *al-Jawhar al-thamīn*, p. 336.

the ruler's full enjoyment of this sport, in addition to the medical treatment of hunting animals that were wounded in the course of this activity. Hawks and falcons were often injured, as described in hawking and falconry treatises, which emphasize the need for speedy and skilled treatment to save their lives. One author describes the many injuries sustained by falcons from air battles with cranes, which would gather together in one group so as to defend themselves from animals trained to hunt them. Sometimes the cranes succeeded in wounding the trained falcons, inflicting severe injuries. Such injuries and the methods of treating falcons wounded during the hunt are described in the professional literature.¹⁵³ Horses too were very likely to be attacked and wounded by the quarry during the hunt, so the presence of veterinarians who specialized in treating horses was essential.¹⁵⁴

One of the hunting grounds of Sultan al-Ashraf Sha'bān (764-778/1363-1376) was in the Ṭinān al-Qaryah region near Fustāṭ, which was known for its luxuriant fruit groves, broad green expanses, and water sources. Other places where he liked hunting were al-Ṭarrānah, located near Lake al-Buḥayrah, and an area outside the Bāb al-Naṣr in Cairo.¹⁵⁵ The fourth month of the lunar calendar—*Rabīʿ al-ākhir*—was his preferred hunting season. Among the more exotic descriptions in this context is that of lion hunting and the remote places where they could be found. This is exemplified by the Mamluk governor of Ṣafad, Amīr Ṣunkur Shāh al-Manṣūrī (governed Ṣafad 704-707/1304-1307), who is said to have been accustomed to go hunt-

¹⁵³ Cambridge University Library, Ms. Or. 464, fols. 60r°-60v°. See also Abū Bakr al-Bayṭār's book on methods of treating wounds inflicted on horses by tigers, lions, wild boar and other predators, Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 141.

¹⁵⁴ Ibn Mankalī describes the treatment of wounds and cuts sustained by horses during the hunt [Ibn Mankalī, *Uns al-malā*, p. 253]. The author of a manuscript housed in: Bodl. L., Ms. ADD. 23,416, refers to the treatment of horses' wounds sustained in battle with predatory animals such as lions, tigers and wild boar during the hunt: fols. 271r°-271v°, 151r°-194v°.

¹⁵⁵ Al-Maqrīzī, *al-Sulūk*, vol III/1, pp. 129, 190; Ibn Duqmāq, *al-Jawhar al-thamīn*, p. 225; Ibn Iyās, *Badāʾiʿ al-zuhūr*, vol. I/2, pp. 3, 111 (هدايا للسلطان من نائب الشام: حيوانات—أسدان وضيع) (وابعون كلبا سلوقيا وابعون فرسا). Al-Maqrīzī mentions many places that were designated for hunting by the sultan. These hunting grounds were partly populated by people who tended the hunting animals and birds, e.g., falconers and dog handlers. See, for example, "suwayqat al-ʿarab": al-Maqrīzī, *al-Khiṭaṭ*, vol. III, p. 226; "birkat al-sibā"—vol. III, p. 263. Abū al-Fidā, *al-Mukhtaṣar*, vol. IV, p. 103. On hunting trips, see also Abū al-Fidā, *al-Mukhtaṣar*, vol. IV, pp. 39, 45, 102, 110, 113, 136; Ibn Duqmāq, *al-Jawhar al-thamīn*, pp. 336, 352, 358, 415, etc.

ing in the forest of Arsūf in Palestine, where one day he caught fifteen lions, including a very large one.¹⁵⁶ These hunting grounds were important working sites of veterinarians and others who dealt with hunting animals. In other words, all those who were involved in the training, feeding, and treatment of these animals accompanied the hunting party, although this subject is not explicitly discussed in the sources. In addition to open spaces, hunting also took place in enclosed areas, which were sometimes fenced in, in wide private grounds allocated for hunting by the ruler, and in private gardens adjacent to the palace.¹⁵⁷ All of these hunting grounds were sites of veterinary activity.

7. Other Sites of Activity

There were certain events and activities during which the presence of veterinarians was clearly essential although little discussion of this appears in contemporary sources. One such activity was the pilgrimage caravan, *Mawkib al-ḥajj*, with thousands of participants, including people of high status in Mamluk society. The medical treatment of the animals that took part in this caravan was particularly important on this long and tiring journey. The caravan was under the sultan's auspices and financed by him, and he appointed a senior military commander to the role of *Amīr al-maḥmal* (officer in charge of the caravan), so we may assume that the veterinarians who took care of the horses, camels and mules in the caravan were also appointed or employed by the sultan.¹⁵⁸

Another place where horses might be injured was the polo field. Polo became very popular among the Mamluk elite and many of the sultans attended and even joined in the games.¹⁵⁹ The presence of veterinarians would almost certainly be required at these times.

The post stations, where horses, mules and postal pigeons were employed, was another sphere in which veterinarians must have been involved occasionally. The argument that the fall of the Umayyads was the result of neglect of these stations, and particularly the wretched condition of the

¹⁵⁶ Sunkur Shāh al-Manṣūrī, see Ibn Ḥajar al-ʿAsqalānī, *al-Durar al-kāminah*, vol. II, p. 175.

¹⁵⁷ B.L., Ms. ADD. 23,417, fols. 61r^o-63v^o.

¹⁵⁸ For a miniature of a caravan of camels bearing the *maḥmil*, see figure 5.

¹⁵⁹ *Furūsiyah* books from the Mamluk period contain a wealth of drawings illustrating different aspects of military training and the various sports included in this framework. See figures 1-3.

horses who worked in this service was a common theme among the authors of the Mamluk period.¹⁶⁰ Apparently, the Mamluk leadership took this lesson to heart and employed veterinarians to take care of the animals in the postal service. As regards the horses, this was clearly necessary, since they belonged to the state and were worth a great deal of money. As for the postal pigeons, perhaps their ongoing care consisted mainly of guarding their health, hygiene and nourishment, as well as training them to deliver mail.¹⁶¹

The use of animals in the numerous building projects of the Mamluk period, which were a source of pride for many Mamluk sultans and emirs, was another possible area of activity for veterinarians. The description of a project to rebuild a bridge that had collapsed can serve as an example. The great number of horses, donkeys, mules and oxen that were employed in this project needed daily care and perhaps also medical treatment.¹⁶²

In the broad social context, veterinarians operated in many sites connected with service to the public, such as treatment of animals that were used for transportation, mostly donkeys, mules and camels. The use of animals for transport and for carrying burdens, including water, was an integral part of everyday life in Medieval Cairo. Mamluk sources provide many descriptions of transportation services based mainly on donkeys, a phenomenon that also greatly impressed foreign travelers who visited Cairo.¹⁶³ The presence of veterinarians in the public markets (treated in greater detail in following section) attests that they also served the general public, which was so much dependent upon these very numerous beasts of burden.

It is most plausible that veterinarians who worked outside the court also treated all kinds of farm animals such as goats, sheep, hens, cows, and bulls in addition to horses, donkeys, mules, and camels, as indicated by the rare testimony of a veterinarian who was active in a village in southern Egypt in 1266.¹⁶⁴

¹⁶⁰ Shāfi' al-'Asqalānī, *al-Faḍl al-ma'thūr*, pp. 132-133; al-Maqrīzī, *al-Khiṭaṭ*, vol. I, pp. 366-367. See also Chapter I, pp. 59-67.

¹⁶¹ J. Sauvaget, *La Post aux chevaux*; Youssef Ragheb, *Les messagers volants*. See also Chapter I, pp. 59-67.

¹⁶² Al-Maqrīzī, *al-Khiṭaṭ*, vol. III, pp. 274, 277.

¹⁶³ Abū al-Fidā, *al-Mukhtaṣar*, vol. IV, p. 142; Leone Africanus, "Descrizione dell'Africa," p. 412; Adolf Reubauer, "Zwei Briefe Abadjah's," p. 211; *The Travels of Meshulam of Volterra*, p. 46. See also chapter I, p. 20.

¹⁶⁴ Goitein, *A Mediterranean Society*, vol. II (The Community), pp. 45-46, 254-257, and note 31, pp. 531-532.

E. GOVERNMENT SUPERVISION OF VETERINARIANS

The *Ḥisbah* books—describing the supervision of the markets, professions and trades—relate to everything connected with regularization of trade in the market in order to safeguard the customers' rights to receive the best possible merchandise for a fair price. Chapters relating to animals occupy an important place in the *Ḥisbah* literature. For example, a book written by a twelfth-century *muḥtasib* named Ibn Bassām al-Muḥtasib contains more than 20 chapters dealing directly or indirectly with animals.¹⁶⁵ From the Mamluk period we have the *Ḥisbah* book bearing the name of Muhammad b. Muhammad b. Ahmad al-Qurashī, known as Ibn al-Ukhūwah (d. 729/1329), who was presumably active in Egypt.¹⁶⁶ Chapter 40 of Ibn al-Ukhūwah's book is devoted to veterinarians (*bayāṭirah*, pl. of *bayṭār*),¹⁶⁷ repeating, more or less verbatim, chapter 47 in Ibn Bassām's book.¹⁶⁸ Other chapters not defined as such by the title also include materials touching

¹⁶⁵ Little is known about Ibn Bassām al-Muḥtasib. The earliest copy of his book is dated to 844/1440, and scholars assume that he served as a *muḥtasib* in Egypt. This is also indicated by his mention of units of weight that were commonly used in Egypt at that time. He relies a great deal on earlier *Ḥisbah* treatise, particularly on the book by al-Shayzarī (d. 589/1193). Another treatise, similar to this one but earlier, is that of Ibn al-Ukhūwah. Ibn Basām extended the book to 114 chapters, while al-Shayzarī's treatise comprises only 40 chapters. The book of Ibn Bassām contains a great deal of material based on the author's personal experience while serving in the role of *muḥtasib*. It is the most comprehensive *Ḥisbah* book that is also based largely on practical experience. In this it differs from many treatises that approach the subject from a religious perspective. Among the writers of such works we can count al-Māwardī (d. 450/1085) in his book *al-Aḥkām al-sulṭānīyah*, al-Ghazālī (d. 505/1111) in his book *Iḥyā' 'Ulūm al-Dīn*, Ibn al-Ukhūwah al-Qurashī (d. 729/1328) in his book *Ma'ālim al-qurbā fi talab al-ḥisbah*, Muḥammad b. 'Awaḍ al-Sunāmī in the book *Kitāb Niṣāb al-iḥtisāb* and many others. See Ibn Bassām al-Muḥtasib, *Nihāyat al-rutbah*, pp. j-kh (ج-خ) Introduction.

¹⁶⁶ Ḍiyā' al-Dīn Muḥammad Ibn Muḥammad al-Qurashī al-Shāfi'ī known as Ibn al-Ukhūwah, *Ma'ālim al-qurbā fi aḥkām al-ḥisba*, pp. xvi-xvii; Ibn Hajar al-Asqalānī, *al-Durrar al-kāminah*, vol. IV, p. 168 (no. 446).

¹⁶⁷ Ibn al-Ukhūwah, *Ma'ālim al-qurbā*, pp. 150-151.

¹⁶⁸ Ibn Bassām al-Muḥtasib, *Nihāyat al-rutbah*, pp. 124-127; Ibn al-Ukhūwah, *Ma'ālim al-qurbā*, pp. 150-152. According to several scholars, both Ibn al-Ukhūwah and Ibn Bassām quoted from an earlier source, apparently written by al-Shayzarī (12th century), who was *muḥtasib* in the Ayyubid period. From the little available information about al-Shayzarī, it appears that he was a doctor in Aleppo and was appointed to serve as a Cadi in Tiberias, indicating that a *muḥtasib* was expected to be proficient in both medicine and religion. R.P. Buckley (trans. with an introduction), *The Book of the Islamic Market Inspector: Nihāyat al-Rutba fi Talab al-Hisba* [Sic.](*The Utmost Authority in the Pursuit of Hisba*) by Abd al-Raḥmān b. Naṣr al-Shayzarī, Oxford University Press on behalf of the University of Manchester, London, 1999, pp. 100-101; Cl. Cahen, M. Talbi and others, "Ḥisba," *E.I.*², vol. III (1971), pp. 485-493.

upon the supervision of trade in animals and connected with veterinary issues. They relate to the supervision of butchers,¹⁶⁹ sheep, goat and camel slaughterers,¹⁷⁰ meat roasters,¹⁷¹ minced meat vendors,¹⁷² bone and sheep head cooks,¹⁷³ cooks (who prepared various kinds of meat dishes for sale in the market),¹⁷⁴ fishmongers,¹⁷⁵ fish fryers,¹⁷⁶ and bird catchers.¹⁷⁷

Similarly, chapters dealing with medical matters and various groups of practitioners have also some relevance to veterinary medicine. These include sections concerning pharmacists and other vendors of medical and cosmetic products,¹⁷⁸ physicians, bloodletters, eye healers, orthopedists and bone healers and surgeons.¹⁷⁹

The examination of prospective veterinarians was similar to that of candidates for all branches of medicine and pharmacology.¹⁸⁰ But in Ibn Bassām's book veterinarians figure at the end of all medical professions whereas Ibn al-Ukhūwah places them at the head of all medical professions. In both treatises this occupation is presented as an honorable profession, and it is pointed out that the early veterinary literature was written by philosophers.¹⁸¹ It is even claimed that this profession is more difficult than

¹⁶⁹ Ibn Bassām al-Muḥtasib, *Nihāyat al-rutbah*, pp. 34-36; Ibn al-Ukhūwah, *Ma'ālim al-qurbā*, pp. 97-105.

¹⁷⁰ Ibn Bassām al-Muḥtasib, *Nihāyat al-rutbah*, pp. 34-36. Ibn al-Ukhūwah does not mention these categories.

¹⁷¹ Ibn Bassām al-Muḥtasib, *Nihāyat al-rutbah*, pp. 37-38; Ibn al-Ukhūwah, *Ma'ālim al-qurbā*, pp. 92-93.

¹⁷² Ibn Bassām al-Muḥtasib, *Nihāyat al-rutbah*, pp. 39-40; Ibn al-Ukhūwah, *Ma'ālim al-qurbā*, pp. 109-110.

¹⁷³ Ibn Bassām al-Muḥtasib, *Nihāyat al-rutbah*, p. 43; Ibn al-Ukhūwah, *Ma'ālim al-qurbā*, pp. 105-106.

¹⁷⁴ Ibn Bassām al-Muḥtasib, *Nihāyat al-rutbah*, pp. 44-45; Ibn al-Ukhūwah, *Ma'ālim al-qurbā*, pp. 106-108. The latter mentions separately vendors of sausages (pp. 93-95) and steaks (pp. 108-109).

¹⁷⁵ Ibn Bassām al-Muḥtasib, *Nihāyat al-rutbah*, pp. 53-55, not mentioned by Ibn al-Ukhūwah.

¹⁷⁶ Ibn Bassām al-Muḥtasib, *Nihāyat al-rutbah*, pp. 56-57; Ibn al-Ukhūwah, *Ma'ālim al-qurbā*, pp. 110-111.

¹⁷⁷ Ibn Bassām al-Muḥtasib, *Nihāyat al-rutbah*, p. 58, not mentioned by Ibn al-Ukhūwah.

¹⁷⁸ Ibn Bassām al-Muḥtasib, *Nihāyat al-rutbah*, pp. 85-95; Ibn al-Ukhūwah, *Ma'ālim al-qurbā*, pp. 115-127. The two authors employ different terms when referring to these occupations.

¹⁷⁹ Ibn Bassām al-Muḥtasib, *Nihāyat al-rutbah*, pp. 108-123; Ibn al-Ukhūwah, *Ma'ālim al-qurbā*, pp. 159-169.

¹⁸⁰ Ibn Bassām al-Muḥtasib, *Nihāyat al-rutbah*, pp. 124-127.

¹⁸¹ Ibn Bassām al-Muḥtasib, *Nihāyat al-rutbah*, p. 124; Ibn al-Ukhūwah, *Ma'ālim al-qurbā*, p. 150.

human medicine because animals are unable to explain to the doctor where they feel pain. This forces the veterinarian to rely only on physical diagnosis, which demand keen senses and more highly developed diagnostic ability than that of the human doctor. It is also states that the *muhtasib* must not allow anyone to engage in the veterinary profession if he does not believe in God, because only religious tenets grounded in sacred laws can prevent him from harming the animals. This is particularly important in the case of an inexperienced veterinarian, who might cause permanent damage or even death. He explains that an animal might be harmed by faulty treatment of a doctor, such as bloodletting or performing surgery that requires cutting, amputation or cauterizing.¹⁸²

After this introduction, the different subjects that the veterinarian has to study are enumerated. The first of these is shoeing horses, donkeys and mules. He reveals considerable knowledge of the subject and enters into the details of preparing the hoof, examining it, filing and cutting the toenails before attaching the horseshoe. The veterinarian has to examine the hoof carefully and observe its shape before cutting or filing it prior to attaching the metal horseshoe, and if the hoof tends to turn aside the veterinarian has to file it into a symmetric shape. We also find a discussion of the type of nails to be used for attaching the shoe, large or small, long or short, soft or hard, all according to the characteristics of the hoof or the shoe. He stresses the skill and precision required in order to avoid future damage. Above all the veterinarian must be careful not to leave any space between the hoof and the shoe where sand or small stones could enter and injure the animals' hooves, causing diseases that would be hard to treat later. On the other hand, attaching the horseshoe too tightly could also cause severe damage.¹⁸³

The *muhtasib* also had to test the prospective veterinarian's abilities at bloodletting. Here, too, the treatises reveal expertise, describing the method of bloodletting with a needle. It is explained how to open the artery, with emphasis on the need for precision in determining the place of the artery to be opened before cutting in order to avoid damaging the blood vessels adjacent to it. The way of holding the animal during the bloodletting procedure was another action that had to be supervised, because the animal had to be held in such a way as to make the arteries on either side of the neck stand out. To succeed in cutting the artery without causing dam-

¹⁸² *Ibid.*

¹⁸³ *Ibid.*

age, the veterinarian had to hold the animal's neck firmly, almost strangling it, but without too much force, and these writings warn of the danger involved in this action due to the proximity of the arteries to the windpipe.¹⁸⁴

Obviously, the basic duty of every veterinarian was to know all the types of diseases that might attack animals, as well as all the defects that might appear in their bodies, because he was the authority to whom people turned seeking a competent opinion on the animal's health. Regarding knowledge of diseases, it is specified that veterinary books describe 320 diseases that might attack animals but he does not mention the title of any treatise from which he drew his material. Of these 320 the two authors chose to discuss only a small number, merely mentioning the diseases' names without entering into any details of methods of diagnosis or treatment, noting that they did not see fit to elaborate on the subject. Apparently *Ḥisbah* books did not help the *muḥtasib* very much when attempting to test the expertise of the veterinarians whose work he was supposed to supervise.

Summarizing the veterinary chapter, it is explicitly stated in both books that it is the *muḥtasib*'s duty not to take lightly the matter of testing the veterinarian. But the question remains: what exactly did he examine? Was it knowledge of the names of all the 320 diseases listed in the veterinary books? Perhaps he also examined their expertise in attaching horseshoes and the most suitable types of nails for every kind of hoof? Or methods of bloodletting? In any case, it is clear that the *muḥtasib* exerted some kind of supervision over the veterinarian's work.

The need of the *muḥtasib* to be acquainted with veterinary materials is clearly reflected in sections dealing with his duty inspect animal traders.¹⁸⁵ Expertise in veterinary matters enables the inspector to diagnose defects and illnesses of animals in order to make the animal traders swear that they will not hide anything from the buyer. He is expected to know the source of every disease, its causes and history, the process of its development at every stage from the beginning until the appearance of external symptoms. Some diseases that the official had to be able to diagnose were *al-dāwīdīyah*, which develops from swelling of the joints; *dukhs*, deafness in animals; *al-lawqah*, a respiratory problem that causes twisting of the upper lip and shortness of breath; and a disease called *kharkharah*, caused by a cold stroke to the animal's head, which affects mainly older animals

¹⁸⁴ Ibn Bassām al-Muḥtasib, *Nihāyat al-rutbah*, p. 125; Ibn al-Ukhūwah, *Maʿālim al-qurbā*, p. 151.

¹⁸⁵ Ibn al-Ukhūwah, *Maʿālim al-qurbā*, pp. 153-154.

and may be transmitted to animals that drink or eat in their company. Every animal trader knew how to examine teeth, hence the inspector also had to be expert in this field, and especially he had to discern whether they had whitened the teeth by artificial means in order to trick the buyer and hide the real age of the animal offered for sale.¹⁸⁶

The *Hisbah* writings also enumerate some characteristics that were considered defective and justified bargaining over the price of the animal, such as, drooping ears, a short neck, or extra canine teeth. Behaviour problems that were regarded as defects included refusal to be examined by the veterinarian, resistance to having a bit in the mouth, kicking, resistance to the stirrup-irons, pulling out the peg to which the animal was tied, running away, and eating the bridle. He also describes some diseases of animals that might affect their eyesight, such as *al-zifr* (cataract). Contracts for the sale of animals such as donkeys, horses and mules (and also slaves) show that eye problems in animals were very common.¹⁸⁷ According to the *Hisbah* books, it was incumbent on the seller to reveal and declare to the purchaser every defect of the animal, whether visible or not, before the deal was closed, otherwise it would be seen as cheating.¹⁸⁸ Therefore, the *muhtasib* had to be cognizant of all the secrets and tricks of the merchants, including medical aspects.

F. PROFESSIONAL ETHICS

One of the first rules in Abū Bakr's guidelines for veterinarians is the instruction not to take money for treatment from a person who cannot afford to pay.¹⁸⁹ This is presented as a rule of primary importance, along with other ethical principles such as the veterinarian's obligation to show loyalty and respect to the teachers who taught him the profession, whether they are alive or dead. Religious precepts are also included in the instructions to veterinarians, such as the obligation to observe the rules of prayer, to perform good deeds and to quote accurately for all to hear verses from

¹⁸⁶ Ibn Bassām al-Muhtasib, *Nihāyat al-rutbah*, pp. 125-127; Ibn al-Ukhūwah, *Ma'ālim al-qurbā*, pp. 151-152.

¹⁸⁷ Yūsuf Rāḡib, *Actes de vente*, pp. 52, 55.

¹⁸⁸ Ibn Bassām al-Muhtasib, *Nihāyat al-rutbah*, p. 153; Ibn al-Ukhūwah, *Ma'ālim al-qurbā*, p. 153.

¹⁸⁹ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 115.

the Hadith concerning animals.¹⁹⁰ This latter rule indicates that religious education was important also to people who worked with animals. Another rule in the domain of ethics was connected to the treatment of incurable or chronic diseases; Abū Bakr enjoins the veterinarian not to deceive owners of animals that suffer from such diseases. He enumerates several ailments of this kind, stating that treatment is not effective and therefore one should not lie to the owner of the animal and say that the disease is curable.¹⁹¹

Ethical rules that appear in hawking/falconry treatises are somewhat different from those in sources dealing with horses, but some rules concerning religious observance are common to both branches. For example, the most salient rule in hawking/falconry and hunting sources obligates the person who engages in these occupations to adhere to the times of prayer and maintain strict purity.¹⁹² Presumably the emphasis on this rule in the falconry literature stemmed from the real difficulty in keeping the times of prayer when out hunting. One author writes that the hunter must always pray at the correct time even when he is in the desert. Observing the times of prayer is also described as contributing to the success of the hunter, while failure to observe this law will lead to failure in hunting as well as in religion.¹⁹³ This instruction, which appears in both types of sources (*bayṭarah* and *bayzarah*), seems to imply that there was a lack of respect for religious observance among people who worked with animals, especially those who were involved in hunting and entertainment.¹⁹⁴ The authors also write that it is forbidden to carry a falcon when in a state of

¹⁹⁰ *Ibid.*

¹⁹¹ Most of the diseases that Abū Bakr describes as incurable are chronic diseases. He even calls them "*maraḍ al-naḥs*," meaning that they result from bad luck. Among these he counts: "*al-khuld al-ṭayyār*, *al-bajal al-ʿatiq*, *al-māʿ al-azraq*, *al-baraṣ al-abyaḍ*, *al-ʿirāj al-muzmīn*." See *Ibid.*, vol. II, p. 117.

¹⁹² (على طهارة كاملة), see Ibn Mankalī, *Uns al-malā*, p. 67; al-Baladī, *al-Kāfi fi al-bayzarah*, p. 123.

¹⁹³ Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 123.

¹⁹⁴ A marionette of a hawker/falconer holding a hawk or a falcon while riding on horseback has survived from the Mamluk period in Egypt, perhaps indicating that hawking and falconry, which was considered a royal occupation, had become a form of entertainment both among the elite and the common people. See figure 21. Although Shadow Theater was a popular form of entertainment in Mamluk society, certain sultans acted against the puppeteers and even gave orders to burn the marionettes. See Qāsim ʿAbduḥ, *ʿAṣr salāṭīn al-mamālīk*, p. 338. For example, in 855/1451 Sultan Jaqmaq ordered all the puppeteers to burn their marionettes and stop their shows. See Ibn Taghrī Birdī, *Ḥawādith al-duḥūr*, vol. II, p. 339. On the life of pleasure-seeking and entertainment, including music and dance performances, shadow theater, circus shows with animals, and even prostitution sponsored by the government, which levied taxes from this trade in Mamluk Cairo see al-Maqrīzī, *al-Khiṭaṭ*, vol. I, p. 171.

inebriation.¹⁹⁵ The subject of drunkenness is noteworthy in the Islamic context, because, apart from the physical fitness and clear-headedness that the falconer needs in his work, it is also a violation of religious laws, but the authors do not emphasize the religious aspect. Another rule, also from the religious sphere, forbids the handler to approach the bird, feed it or touch it after having sexual intercourse, because hunting birds cannot bear to be touched by someone who is not in a state of “purity” according to Islamic laws. One treatise even features the evidence of an experienced hawker/falconer, who reported that every time he approached a hunting bird when he was “impure” after sexual relations, the bird immediately sensed it and his general condition deteriorated.¹⁹⁶

With regard to ethical guidelines that are more directly related to attitudes to animals, there are innumerable detailed descriptions, all mentioning the moral obligation of people who take care of animals to treat them compassionately, a moral obligation that became a fundamental part of the guidelines defining the ethics of the profession. Abū Bakr writes that he sees this quality of “compassion” as an unconditional rule in the veterinarian’s behaviour towards animals.¹⁹⁷ If an animal contracted an incurable disease and the doctors knew that it had no chance of recovering, their moral obligation was to help the animal as much as they could, not necessarily by giving medical treatment but by being gentle and helping to alleviate the animal’s suffering. The keyword that appears in this context is *rifq*, meaning compassion and gentleness. Several sources emphasize that this attitude sometimes serves as an alternative to medical treatment and is perhaps the most important thing that has to be done for a sick animal when the veterinarian has no medical solution.¹⁹⁸ One example described in this respect concerns a hawk that was dying from an incurable disease. The bird doctor did not give up and went on treating it for days, stroking it and treating it gently until finally his efforts bore fruit and the hawk recovered. The story goes that this hawker/falconer treated the hawk for seven years, while its condition fluctuated between severe illness and partial recovery, when it could even go hunting and display special talent

¹⁹⁵ Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 122; al-Ḥasan b. al-Ḥusayn, *al-Bayzarah*, p. 77.

¹⁹⁶ Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 122.

¹⁹⁷ Abū Bakr emphasizes that animals respond to people who treat them compassionately and gently, while harsh treatment and punishment by beating only aggravate their condition and cause them almost irreparable damage. (لأنّ من الدواب من تجيب إلى كلّ ما تطلب منه بالرفق) وكما ضربته سوء خلقه وتغير عن الإجابة (والمداواة، ولا يجيب إلى ذلك بالضرب، وكما ضربته سوء خلقه وتغير عن الإجابة). See Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 155.

¹⁹⁸ Al-Ḥasan b. al-Ḥusayn, *al-Bayzarah*, p. 82.

in catching water fowl.¹⁹⁹ The hawk or falcon often needed the hawker/falconer's ministrations, and without his ongoing devoted care, and above all his compassionate attitude and infinite patience, it is doubtful whether the bird would have survived all those years.

The veterinary writings, especially when relating to the training of horses to take riders, express the need to take into consideration the animal's individual character. The young colt does not by nature agree to have someone riding on his back, and the guidelines take into consideration the nature and temperament of the horse designated for riding, stressing that it is the duty of every horse handler to be acquainted with these principles before beginning to work with the horse.

Abū Bakr warns the trainer against using violent punishments, and it is especially forbidden to whip a horse that does not respond to training or makes some mistake when carrying out an order, saying that whipping or punishing a horse is liable to render him low-spirited and depressed, with a vacant gaze.²⁰⁰ In general, beating animals, especially in the face, was forbidden by religious tradition and many writers of veterinary literature confirm this by quoting sayings from the Hadith attributed to the Prophet Muḥammad, totally forbidding the beating of animals.²⁰¹ The writers repeatedly emphasize the need for gentleness and compassion throughout all the training, expressed by close physical contact with the horse, stroking it, combing its hair and rubbing its skin with fragrant substances like *al-ṭib* (a generic term for incense) that are good for the horse's hair and skin.²⁰² These texts show us that people who engaged in this profession were expected to take into account individual differences between animals.²⁰³

The author of a fourteenth-century veterinary book, who declares that he himself worked as a veterinarian for many years, warns against entrusting horses to a veterinarian who is not gentle or careful. He describes several character traits worthy of veterinarians, such as gentleness, compassion, forbearance and kindness. It is interesting that most of the

¹⁹⁹ *Ibid.*, pp. 82-84.

²⁰⁰ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 153.

²⁰¹ The prophetic tradition mentions a man whom the Prophet saw hitting his horse in the face and cursing him. The Prophet told him that he would be punished for the cruel act on the Day of Judgment and would burn in hell, adding that only participation in Jihad wars could redeem him. Another tradition, also related to man's behaviour towards his horse, instructs the believers not to lead horses by pulling their mane because this hurts and humiliates them and makes them submissive. See al-Dimiyāṭī, *Fādl al-khayl*, p. 38.

²⁰² Al-Malik al-Ashraf, *al-Mughnī fī al-bayṭarah*, pp. 51-53.

²⁰³ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, pp. 139-143, 153-155.

writers stress such character traits as being most important, preceding professional skills. The same writer reports having seen many veterinarians who treated animals by methods that were completely redundant in order to exacerbate the animal's condition and make it look more severe to the owner. In this way they make an impression on spectators and charge the animals' owners higher fees, but only cause harm and aggravate the animal's condition. The same writer testifies that he saw with his own eyes many animals that were harmed by unnecessary treatment that caused more damage than the disease that they were supposed to cure.²⁰⁴

One author, who writes about the state of the veterinary profession in fourteenth-century Baghdad, also reveals some uncomplimentary traits of contemporary veterinarians. He remarks that his contemporaries disparage animal doctors, in contrast to their respect for human doctors, explaining that if a doctor causes a patient to die he can shift the blame to his assistant (*mutaṭabbib*). Shaking off responsibility like this is not acceptable in society, and such a doctor quickly loses his livelihood because people stop coming to him for advice or any kind of treatment. However, says the writer, the veterinarian's situation is totally different, since a veterinarian can cause the death of untold animals and this will not affect his income at all, because people do not hold it against him and continue coming to him for help. This is considered by the writer as a result of indifference towards the life of animals and their illnesses. He therefore recommends holding examinations to test the medical knowledge of every veterinarian who seeks to treat animals, adding that the test should include knowledge on the character of animals.²⁰⁵ One may deduce from this writing that veterinarians were not tested on any medical or professional knowledge that could prepare them to work in this field, which may indicate disdain for the profession in his period (14th century), at least in the geographical region in which he operated (Baghdad under the Ilkhānīd rule—some 50 years after it was conquered by the Mongols). Although this is only one source that refers to lack of concern for the lives of animals, it appears to represent a general approach that was prevalent in society at large regarding the professionalism of animal doctors. It may, however, refer to particularly veterinarians who worked among the common people.

²⁰⁴ Anonymous, *al-Jawād al-ʿarabī*, p. 161.

²⁰⁵ *Ibid.*

CHAPTER FIVE

THEORETICAL ASPECTS

A. ELEMENTS, TEMPERAMENTS AND HUMOURS IN GENERAL MEDICINE

The prevalent medical theory throughout the Middle Ages was the theory of the four humours, based on the assumption that the universe was composed of four elements, each with its own characteristic temperament. According to this theory, the living body was also composed of four humours: blood, phlegm, yellow bile and black bile, and an even balance of the four was a guarantee of good health. This theory was accepted unquestioningly by the Muslim doctors, who adopted it from the writings of classical philosophers such as Hippocrates, Galen, and Dioscorides.¹ The greatest Muslim doctors, such as Abū Bakr al-Rāzī, Ibn Sīnā, Ibn al-Nafīs, Ibn Rushd, devoted chapters of their medical treatises to explanations of the principles of this theory and how it worked in relation to the human body. Most, if not all, of the physical and mental diseases that affected human beings were explained in the framework of the four humours theory, and as veterinary medicine was also based on the same theory, it is appropriate here to give a broad outline of its principles.²

¹ On the principles of the medical theory taught in the Middle Ages, see Ch. H. Talbot, "Medicine," *Science in the Middle Ages*, ed. D.C. Lindberg, Chicago, 1978, pp. 391-428.

² Abū 'Alī b. Abd Allāh b. al-Ḥusayn Ibn Sīnā (370-428/980-1037), *al-Urjūzah fī al-ṭibb (dimn kitāb: min mu'allafāt Ibn Sīnā al-ṭibbiyah)*, ed. Muḥammad Zuhayr al-Bābā: Aleppo: Manshūrāt Jāmi'at Ḥalab and Ma'had al-Turāth al-'Ilmī al-'Arabī wa-Ma'had al-Makhṭūṭāt al-Ṭibbiyah, 1404/1984, pp. 93-194; Ibn Sīnā, *al-Qānūn fī al-ṭibb*, ed. Edwār al-Qush, Beirut: Mu'assasat 'Izz al-Dīn lil-Ṭibā'ah wa-al-Nashr, 1993, vol. I (book 1), pp. 13-98 (fī al-umūr al-kulliyah fī 'ilm al-ṭibb); Martin Levi and Safwat Suryal, "Usus al-Ṭibb fī al-Qarn al-Ḥādī 'Ashar min Kitāb al-l'tidāl lil-Nasawī," *al-Mashriq*, II (April, 1969, year 63), pp. 141-156; Ibn Rushd, *Rasā'il ibn Rushd al-ṭibbiyah*, ed. Jorj Shihāta Qanawī wa-Sa'id Zāyid, Cairo: Markaz Taḥqīq al-Turāth, 1987, pp. 75-140. In order to facilitate the learning of this theory by heart, Ibn Sīnā formulated its principles in verse, on the pattern of the *Kunāsh*, whose aim was to examine the expertise of the people who served in the court and to enable the rulers to examine the materials by themselves, and perhaps also to study the medical rules and the basics of medical science. See Ibn Sīnā, *al-Urjūzah*, p. 89.

1. *Elements*

According to Muslim medicine, like Galenic medicine before it, the human body takes from the universe those elements that compose it, through the food it consumes and the air it breathes. Hence, the doctors posited a similarity between the universe and the human body, based on the assumption that the four elements of which the universe is composed—fire, earth, water, and air—embody four qualities—heat, dryness, cold, and moistness³. But in nature these qualities do not exist in their pure state. For example, fire is mixed with smoke and soot, in water there are always other components, and the same applies to earth and air. The elements are also the supreme expression of the qualities, thus the body with the highest level of heat is fire, the coldest is water, the moistest air, and the driest earth. Every basic quality of every element is joined by a quality belonging to another element, and both qualities together become a basic part of the element. Thus fire acquires the quality of dryness, air acquires heat, water acquires moisture, and earth acquires the quality of cold. This combination of qualities is called the “power of the element,” and from this derives the nature of fire—hot and dry, the nature of air—hot and moist, the nature of water—cold and moist, and of earth—cold and dry.

2. *Temperaments*

Everything in the universe, according to this theory, is a combination of the four elements and their qualities, in varying amounts and proportions. The proportion of the combination in each body is called *mizāj* (Temperament) and a body in which the elements exist in equal quantities is balanced. The temperament of a body that is not balanced depends on the predominant element; for example, the temperament of a body that is dominated by the element of fire is hot. If the elements of air and fire are equally dominant, the temperament is composed of heat and moisture, and so forth. Hence, there are nine temperaments, only one of them balanced. Of the eight that are imbalanced, four are simple: hot, cold, dry, and moist, and four are complex: hot and dry, hot and moist, cold and dry, and cold and moist. In addition, there are countless intermediate levels produced by the mixture of temperaments, and this is manifested in the differences between bodies. External factors, such as climate, age, sex, and occupation, also influence the temperament of the body. Among all the

³ Ibn Sīnā, *al-Urjūzah*, p. 92.

animals, including humans, the theory states, the male has a hotter and drier temperament than the female, whose temperament is mainly seen as cold and moist, and the old have a colder and drier temperament than the young. The temperament is also the source of differences between humans in skin colour, hair colour, and even eye colour.⁴ The individual's occupation also influences his temperament; for example, a glassblower will have a hot dry temperament, a bathhouse attendant will have a hot and moist temperament, and a seaman's temperament will be cold and moist.

3. Humours

The humours, *akhlāt*, are defined in this medical theory as 'secondary elements' (*al-jawāhir al-thawānī*) or the 'daughters of the elements' (*banāt al-arkān*).⁵ Every organ in the bodies of humans and animals is made up of four components that correspond to the four humours: blood (*dam*), phlegm/white bile (*balgham*), yellow bile (*ṣafrā*), and black bile (*sawdā*). The four humours are associated with the four elements, so that fire corresponds with yellow bile, the temperament of which is hot and dry, air corresponds with blood, whose temperament is hot and moist, water corresponds with phlegm, with its cold, moist temperament, and earth corresponds with black bile, whose temperament is cold and dry. The medical theory explains the humours in great detail, describing their sources and the way they operate in the body.⁶

A. Blood is formed in the liver from the juice of digested food (*kīmūs* or *kīlūs*). Natural blood is red, with a uniform consistency, it has a sweet taste and coagulates quickly. The natural temperament of blood is hot and moist, but it is liable to be affected by other organs through which it flows; for example, if there is cold and moisture in the liver it will cause the blood to be thin and watery.

B. Phlegm flows in the veins and through them it feeds the organs. The medical literature offers four different descriptions of changes in the natural temperament of the phlegm that cause irregularity and render it unhealthy: "sour phlegm," which is cold and dry, "salty phlegm"—hot and dry,

⁴ Ibn Sinā, *al-Qānūn*, vol. I (book 1), pp. 19-27.

⁵ Ullmann, *Islamic Medicine*, pp. 56-58.

⁶ See, for example, Ibn Sinā's explanations in the chapter "On the formation of the humours": Ibn Sinā, *al-Qānūn*, vol. I (book 1), pp. 29-36; Ullmann, *Islamic Medicine*, pp. 57-60.

“sweet phlegm”—hot and moist, and phlegm called “glassy,” with a very cold, moist and coarse temperament.

C. Yellow bile is delicate and its colour is red. It flows in the veins with the blood and its role is to dilute the blood so that it can penetrate the narrowest capillaries. The temperament of this humour is hot and dry. The medical sources mention various types of unhealthy yellow bile, among them one that resembles a kind of dough formed in the stomach after eating vegetables.

D. Black bile also flows with the blood, and feeds the organs that need nourishment matching its cold, dry temperament, such as the bones. An unhealthy variation of this humour is produced by the “burning” of black or yellow bile and it causes severe illnesses such as leprosy, cancerous growths, and more. Black bile mainly influences mental states and causes depression. Therefore, we often find depressed individuals described in the sources as “having black bile.” The medical sources ascribe powerful influence to black bile as the main cause of many diseases. In addition to melancholia, which originates in the brain and is identified with a surplus of black bile, they also refer to headaches, sleeplessness, fever, various kinds of cramps, cancer, sharp abdominal pains, retention of urine, colic (*qūlanj*), rabies, Haemorrhoids, epilepsy, kidney stones and bladder stones, pubic swelling, varicose veins in the legs (*nuqrūṣ*), and more.⁷

As mentioned, the theory of the humours states that the health of a living body depends on the balance of the humours. However, not every deviation from balance necessarily causes illness. According to Galen, many bodily conditions are dependent on external factors such as age, occupation, gender, and season of the year, which upset the balance of the humours without detracting from the healthy state of the body. Thus, the theory of the humours explains not only states of health and illness, but also differences between healthy individuals. It describes in minute detail every organ of the human body and the influence of the humours on its physiological functioning. Ibn Sīnā concurs with Galen and rejects the arguments of those who assert that the only natural humour in the body is blood, while the other three humours are superfluous and the body does not need them at all. Ibn Sīnā explains that if blood alone was necessary and if it was the only humour that nourished all the parts of the body and caused them to grow, all the organs created would have a similar temperament and there would be no bones, which by their nature are stronger

⁷ Ibn Sīnā, *al-Urjūzah*, p. 188.

and more rigid than the fleshy parts. Hence, the theory assumes that the blood is mixed with the other humours, and this can be proven by examining a sample of blood taken from the body, declares Ibn Sīnā. He asserts that it is possible to separate the various components of the blood: sanguine (bloody) humour, yellow bile, which looks like foam, phlegm, similar in form and colour to egg whites, and the last part, that remains at the bottom of the bottle, is heavy and cloudy and is identified with black bile. Besides the four humours, says Ibn Sīnā, an examination of the blood also reveals the existence of a watery part, whose function consists of softening the food and facilitating its absorption in the body, while the humours nourish the body and build the organs.⁸

B. THE GALENIC THEORY OF VETERINARY MEDICINE

It was not uncommon for doctors who treated humans and were experts in medical theory of the temperaments to take an interest in animals, and some sources quote anecdotes concerning famous doctors who treated animals. Their reason for treating animals was that it enabled them to draw analogies between animals and humans, using the principles of medical theory.⁹ An anecdote related to Abū Bakr al-Rāzī (d. 311 AH/923 AD), which is also cited in veterinary books, can be brought as an example. One day, when Abū Bakr al-Rāzī was in the sultan's company, the sultan's favourite horse was brought to him in a severe condition. The horse squirmed in pain until he finally fell to the ground, unable to stand on his feet, gasping for breath and shivering in pain. After some thought, Abū Bakr, a doctor of humans and not of animals, decided to use the same medicines and treatments that he prescribed for humans in a similar condition. He diagnosed that the horse was suffering from colic, which affects humans in the same way. The only thing that he changed in the treatment was the quantity and the manner of administering the drug. As soon as it received the drug, the nature and composition of which is not mentioned in the sources, the horse's condition slightly ameliorated, and following further treatment with suitable laxatives, he recovered completely. The story goes that

⁸ Ibn Sīnā, *al-Qānūn*, vol. I (book 1), pp. 33-34.

⁹ Most of the veterinary treatises quote Aristotle as saying that the horse's nature is similar to that of man. This nature, according to Aristotle, is composed of four types of "nature." He adds that horses are susceptible to illness exactly like humans, and the treatment is also similar. Another similarity to humans cited by the veterinary sources is that the horse ages and his hair goes grey. See Bodl. L. Ms. Arab d. 208, fol. 2v^o.

this horse, whenever he saw Abū Bakr al-Rāzī passing by, would look at him with a gaze expressing friendship, affection and gratitude.¹⁰ Perhaps the purpose of this story was to demonstrate that medical treatment of animals is often similar to that of humans, and that the main difference was in the dosage of medicine given to an animal and the manner in which it was administered. Al-Bakhshī al-Ḥalabī writes that animals' diseases are similar to those that afflict humans. He distinguishes between two types of illness: those that attack humans and other animals, and are treated in the same way, and those that are unique to animals. Regarding the former, he writes that this knowledge can be acquired from general medical books, the only difference being the quantity of medicine to be given to animals and the way it is given, due to their different temperaments. Al-Bakhshī quotes al-Anṭākī, whom he calls al-Shaykh Dāūd, stating that everything that moves of its own free will is composed of the four temperaments (*al-akhlāṭ al-arbaʿah*). Every such creature has two conditions: sickness and health, therefore it is necessary to balance the humours while taking into consideration and observing the difference in the kind of food, and the composition and quantity of the medicine. As stated, the horse's temperament resembles that of man, but it is necessary to consider the size of the body, which requires a larger amount of medicine. After this theoretical description, the writer specifies types of illnesses that are common to humans and horses, comparing not only the illnesses but also the treatment of them, and generally also mentions the humour that has a malign effect and causes the onset of the disease discussed in the chapter.¹¹ It may be assumed that the predominant description of horses as having a temperament similar to that of humans, and as the animals with the most balanced temperament after humans, influenced the approach and the attitude toward them. Also on the subject of training, the horse is described as having the most balanced temperament, which renders him capable of learning and responding to training by man.¹² One author goes so far as to say that some people succeed in teaching the horse special forms of behaviour, such as bowing to an emir or walking on a narrow wall, explaining that this is a result of his balanced temperament.¹³

¹⁰ Muḥammad al-Bakhshī al-Ḥalabī, *Rashaḥāt al-midād fi-mā yataʿallaq bi-al-ṣāfināt al-jiyād*, ed. Muḥammad Rāghib al-Ṭabbākh, Aleppo: al-Maṭbaʿah al-ʿIlmiyyah, 1394/1930, p. 108 (on the same book of al-Dimyāṭī, *Faḍl al-khayl*).

¹¹ Al-Bakhshī al-Ḥalabī, *Rashaḥāt*, pp. 107–115; al-Anṭākī, *al-Tadhkarah*, vol. II, pp. 56–57; Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 91.

¹² Al-Bakhshī al-Ḥalabī, *Rashaḥāt*, p. 107.

¹³ *Ibid.*

Thus veterinary medicine, like general medicine, adopted the Galenic theory as a basis for the treatment of animals. Most of the veterinary sources, both those dealing with large animals such as horses, donkeys, mules and camels, and those dealing with small animals like birds, address questions concerning the temperament of animals. Generally, they mention it at the beginning of the treatise and describe the temperament of the animal discussed, pointing out the medical implications. For example, the author of a book on horses states that the four humours exist in the horse's body and the dominant element is air, hence the horse's temperament is hot and dry.¹⁴ Most of the veterinary treatises accompany this explanation with the tradition of the horse's creation, citing the Hadith of the Prophet Muḥammad.¹⁵

Abū Bakr al-Bayṭār, too, refers to the story of the creation of the horse, quoting Wahab b. Munabbih's description of how God said to the south wind, "Behold, Here I am creating out of you creatures who will bring solace to my believers, submission to my enemies, and beauty to the people who obey me." God held in his hand a wisp of the south wind and created the horse from it, saying, "I have named you horse and made you Arab; good clings to your forehead, the spoils of war are carried on your back, and prosperity will accompany you wherever you go. Of all the beasts of burden, I will guarantee your wellbeing and your livelihood, and you will be their master. You will fly without wings, because you were created for chasing and also for retreating and escaping. People who praise my name will ride on your back, and you will praise my name with them; they will glorify me and so will you." When the horse neighed, God said, "Blessed are you, threaten the enemies with your neighing, instill fear and terror in the infidels' hearts and make them submit to the yoke."¹⁶ As well as the story of the creation, the traditions tell of the first man's choice of the horse

¹⁴ *Ibid.*, pp. 4-5.

¹⁵ For example, al-Dimyāṭī, in his book on the superiority of horses (*Faḍl al-khayl*), cites the tradition of the creation of the horse from the south wind. In his usual fashion, he mentions the entire chain of those who passed down the Hadith tradition from the Prophet, but unlike veterinary authors, he does not refer to the horse's temperament in this context. See al-Dimyāṭī, *Faḍl al-khayl*, pp. 28-29.

¹⁶ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, pp. 97-81; al-Dimyāṭī, *Faḍl al-khayl*, pp. 28-29. A manuscript in the French National Library, attributed to Wahab Ibn Munabbih according to the inscription, features a different version of this tradition, including further details explaining the horse's neighing as an expression of thanks to God for creating him. According to the tradition cited in this manuscript, God appointed angels to accompany the horse morning and evening in order to supervise the master's behaviour toward the horse. See B.N., Ms. Arabe 2817, fols. 3v^o -4r^o.

as his preferred animal after God had presented all the animals to him and taught him their names. The veterinary sources that quote the various traditions regarding the creation of the horse add a description of the honor and prestige granted to it and emphasize that the horse was so close to the believers that he extolled God by neighing just as the believers did when riding on his back.¹⁷

These sources also point to the link between the religious traditions and the medical theory from the classical heritage. Sometimes we find a precise mention of the source of the south wind from which the horse was created, and where it was blowing when God caught a wisp of it. According to some traditions the south wind was blowing from the right side of the Ka'bah in Mecca, and they emphasize that it was a wind with a hot, dry temperament from which God created the horse (according to another tradition, it was the angel Gabriel who held the wind in his hand and then God created the first horse from it). The traditions also add details related to the colour of the first horse, which they say was brown or dark red (*kumayt*), and they compare it to the skin colour of the first man, brown.¹⁸ The attitude towards colours was also rooted in the theory of the humours, and the veterinary sources declare that the dominant humour in the horse's body is the main reason for its skin colour.¹⁹ They state that the horse's nature matches the nature of the south wind, from which it was created, and the element of air influences not only its temperament but also its physical attributes such as its galloping speed, the lightness of its movements, and the gentleness of its touch.²⁰

In addition to the Islamic traditions described above, and particularly the story of the horse's creation from the element of air, other versions are presented by certain writers, especially professional veterinarians, who attempt to explain the theory in a different, perhaps more rational, way, independent of the religious account. For example, Abū Bakr al-Bayṭār, in a chapter entitled "The differences between the horse and man, such as speech and temperament," writes that the difference between the tem-

¹⁷ Al-Bakhshī al-Ḥalabī, *Rashaḥāt*, p. 4; al-Dimyāṭī, *Faḍl al-khayl*, p. 28.

¹⁸ Al-Bakhshī al-Ḥalabī, *Rashaḥāt*, 4-5; al-Dimyāṭī, *Faḍl al-khayl*, p. 28; al-Malik al-Mujāhid, *al-Aqwāl-kāfiyah*, pp. 99-100. See, for example, figures 22 and 23, which show the build and the red or black colour of the horse that was considered to be most noble.

¹⁹ Al-Malik al-Mujāhid, for example, devotes an entire chapter to the theory of colours and their influence. He states that the yellow (cream) colour of a horse results from the dominance of yellow bile in the horse's body. See al-Malik al-Mujāhid, *al-Aqwāl-kāfiyah*, p. 128.

²⁰ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, pp. 79-81.

perament of the horse and that of man stems mainly from the size of the horse's body and the density of its organs, while man has a softer temperament and a gentler nature than a horse.²¹ The attempt to explain differences in temperament by the horse's body and bone structure is unique in veterinary literature, and indicates a pragmatic and rational approach.

The theoretical explanation of the differences between the temperaments of humans and animals served the veterinary writers to develop a theory of treatment. Abū Bakr, for example, states that the difference between temperaments calls for the use of different medications. Humans are treated with "complex" medicines, that have more gentle qualities, while large animals such as horses have to be treated with medicines that are not complex because their temperament is stronger and requires medicines that are more powerful.²² An examination of the ingredients of the medicines recommended in the veterinary sources reveals that the principle articulated by Abū Bakr was taken into account with regard to various kinds of treatment such as the use of laxatives, kohl (collyrium), appliances to heal or set broken bones, preparation of lotions for massaging animals, powders of different kinds, and so forth.²³

The theory of the four temperaments or four humours seems to have been more dominant in falconry than in horse medicine, as can be seen from an examination of the theoretical contents of Arabic falconry treatises. Yellow bile is described as the dominant humour in the body of every species of hunting bird, and birds' diseases are always discussed in the context of the humours. Generally, the explanations are divided according to the causes of the disease, including external causes that are visible to the eye and internal causes that are not discernible. Internally caused diseases are imputed to disturbance of the balance of the humours. Beyond this general statement, the authors relate in more detail to the three humours, blood, phlegm, and black bile, explaining that blood diseases have a hot, moist temperament, phlegmatic illnesses have a cold, moist temperament, and diseases caused by an excess of black bile have a cold, dry temperament. As yellow bile is the birds' dominant humour, diseases are rarely caused by this humour. According to this explanation, the natural temperament of hunting birds is hot and dry, influenced by the temperament

²¹ وأما مخالفة الفرس للإنسان في المزاج فإنه يكون بسبب عظم جرم الحيوان وكثافة أعضائه لأن الادي أرق" *Ibid.*, p. 91.

²² *Ibid.*, pp. 91-93.

²³ *Ibid.*

of the yellow bile in their bodies. Good health in hunting birds is expressed in the restoration of the natural balance between the humours, reflected in the dominance of yellow bile, which matches their hot, dry temperament.²⁴

The veterinary treatises that deal with hunting birds describe the symptoms of illnesses caused by the arousal or increase of a certain humour in the bird's body. Each humour is described in detail, including the special signs that indicate certain diseases. For example, the stimulation and increase of the red humour (blood) causes the temperature to rise in the head and eyes, resulting in swelling in the head and neck. Other symptoms of imbalance caused by excess blood are eyes turning yellow, swelling of the eye sockets, swelling around the beak and nostrils. Sometimes the bird also spits out a smoke-like substance. This imbalance of the blood may also affect the bird's movement, sometimes expressed by opening the beak and being unable to close it, constant stretching, sudden wing movements alternating with total limpness, changes in the pace of wing movements, switching abruptly from a sluggish state to the intense activity of flight. An excess of blood might also lead to behaviour disturbances such as the bird hurling itself at the stick on which it is supposed to sit and then at the floor if it is near the floor. According to the veterinary treatises, all these symptoms are the result of excessive bloody humour in the hunting bird's body; the symptoms may appear individually, but when the condition is particularly severe they may appear all together.²⁵

Phlegm—the white humour (*balgham*)—mainly affects the bird's digestive system. The writers explain that an excess of this humour in the body makes the stomach full, causing the bird to open its beak constantly even when it is not hungry, although excessive phlegm leads to loss of appetite. It also affects the consistency of the faeces, which become softer and have a bad smell. In this condition the bird shakes its head a great deal after defecating and emits grating sounds, even shrieking and howling until it becomes hoarse. It breathes heavily and vomits the food it has managed to eat, its feet swell and acquire a greenish colour with blisters the size of coriander seeds or, according to a different treatise, of lentils.²⁶ According

²⁴ Al-Baladī, *al-Kāfi fī al-bayzarah*, p. 207; Ibn Qushtumur, *al-Qānūn al-wāḍiḥ*, Köprülü Kütüphanesi, *Istanbul*, Ms. 978, fols. 87v^o–89r^o.

²⁵ Al-Baladī, *al-Kāfi fī al-bayzarah*, p. 208; al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, pp. 70–75; Al-Ḥasan b. al-Ḥusayn al-Bāzyār, *al-Bayzarah*, p. 80; Ibn Qushtumur, *al-Qānūn al-wāḍiḥ*, K.K., Ms. 978, fol. 87v^o.

²⁶ Al-Baladī, *al-Kāfi fī al-bayzarah*, p. 208; Ibn Qushtumur, *al-Qānūn al-wāḍiḥ*, K.K., Ms. 978, fol. 87v^o.

to the veterinary sources, the disease called *al-khanān* results from an excess of white humour in the body and mostly affects the bird's back and cheeks, causes swelling and sores that finally secrete a yellow purulent discharge and the bird may even fall on its side.²⁷ The increase of phlegm in the bird's body is liable to cause some other grave diseases, including the following: (a) *al-rabū*—a severe respiratory disease—asthma (b) *al-khunāq*—a disease that affects the throat and sometimes also the head, and mainly attacks the respiratory system (c) *al-nuqrus*—arthritis (or gout) (d)—*al-aklah*—swelling (or a tumour) that appears on both sides of the bird's cheeks and jaws and also under the wings and causes weakness and limpness of the wings. The signs of this disease may mislead the falconers into thinking that the bird is about to moult, since the signs are similar.²⁸

The third humour, black bile, has a cold, dry temperament that is influenced by the element of air, usually referred to by veterinarians as wind—*al-rīḥ*, and its arousal or increase in the bird's body affects it in a way similar to the disease *al-khanān*, and also causes another disease called *al-fuwāq*, leading to difficulties in breathing and even choking. The writers describe some of the effects of these diseases, such as choking, violent headshaking and inability to swallow food. Even if the bird can swallow, this does not mean that its condition improved, because the food is not digested in the stomach and causes severe constipation, leading the bird to rub its anus and moan with pain. An excess of black bile may also cause dryness at the bases of the wings and above the shoulders. Another severe disease that derives from the same source is called *al-naḥās*, and it, too, affects the respiratory system.²⁹

An important issue that occupied many people who dealt with falcons and hawks, especially falconers, concerned assessing the state of health of a hunting bird during its purchase. In this matter, too, the veterinary literature relies on the medical theory of the humours and refers to the connection between the nature (or temperament) of the human, who is considered the most balanced creature in terms of humours, and the nature of animals. This comparison of man's temperament with that of hunting birds is usually presented as an answer to the question of Alexander the Great on the nature of the hawk and how close it is to man. The mention

²⁷ Al-Baladī says that there are two types of *al-khanān*: the moist type, which causes heavy breathing and stomach rumbling, and the dry type, which causes gradual loss of weight, noticeable opening of the beak, and secretion from the nostrils. See al-Baladī, *al-Kāfi fī al-bayzarah*, p. 209; *Qāmūs al-aṭibbā'*, vol. II, p. 150.

²⁸ Al-Baladī, *al-Kāfi fī al-bayzarah*, p. 209.

²⁹ *Ibid.*; al-Ghitrif, *Kitāb Ḍawārī al-ṭayr*, p. 76.

of Alexander the Great (Iskandar b. Filibs al-Rūmī) perhaps indicates the Greco-Roman-Byzantine origin of these materials which over the years became an integral part of Arabic falconry treatises.³⁰

Some writers provide lists of species of hunting birds and their particular temperaments. Thus we read, for example, that the Peregrine (*shāhīn*) has the driest temperament, the Saker (*ṣaqr*) is the least dry, the eagle (*uqāb*) has a temperament similar to that of the hawk, and so forth.³¹ According to this explanation, the temperament of birds appears to be similar to that of horses, who are also described as having a hot, dry temperament. However, veterinary treatises on horses do not expand so much on the details of the medical theory. It is also claimed that the goshawk's (*bāz*) temperament is hot and moist or hot and dry, according to the state of its health at different times and since it has the hottest temperament of all the hunting birds it is also the bravest.³²

Although the prevalent opinion among these writers was that the hawks' hot, dry temperament stem from their yellow bile, we can also find a different opinion, namely, that the dominant temperament of the hawk and of other hunting animals, including cheetahs, has its source in phlegm, which has a moist, cold temperament. According to this opinion, phlegm is also the main cause of sickness in hunting animals.³³ Since none of these theories could be proven, every assumption of a certain animal having one temperament or another could be claimed to be the correct one. With some degree of sophistication the writers attempt to blur the contradictions by relating not only to the general temperament, or, as they call it, the "original nature" (*ṭab'uhā* this only means 'their nature'), which is affected by a certain humour that is dominant in the body, but also insisting that every organ in the body has its own unique temperament. For example, the temperament of the hawk's stomach is said to be moist or phlegmatic.³⁴

³⁰ Al-Baladī, *al-Kāfi fī al-bayzarah*, pp. 201, 206; al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, pp. 69-76; Ibn Qushtumur, *al-Qānūn*, K.K., Ms. 978, fol. 88 r°. On references to figures from the Greco-Roman world, see also Chapter II, pp. 81-90.

³¹ Al-Baladī, *al-Kāfi fī al-bayzarah*, pp. 201-202; Ibn Qushtumur, *al-Qānūn*, K.K., Ms. 978, fol. 88 r°.

³² Al-Ghiṭrīf's book contains quotations from Arsījānūs describing the falcon's hot temperament as the source of its courage, despite its weak body. See al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, p. 21.

³³ Al-Ḥasan b. al-Ḥusayn al-Bāzyār, *al-Bayzarah*, p. 75.

³⁴ "مزاج بطون الصقور بلغمي رطب," see al-Baladī, *al-Kāfi fī al-bayzarah*, p. 187.

A similar contradiction appears with regard to the prevalent view concerning the hot, dry temperament of the horse, matching the element of air, from which it was created. According to the original theory, air is characterized by a hot, moist temperament, not a hot dry one. Here, too, we find an explanation in the veterinary sources, which refer to the special temperament of the south wind that was blowing from Mecca at a certain time on the appearance of the star Canopus, *Suhayl*. This appears to be a sophisticated attempt to smooth over the contradictions on the subject, because these writers presumably wanted to introduce “scientific” content to support the scientific-medical-philosophical theory that had prevailed unquestioned for hundreds of years. The authors who wrote about animal medicine saw themselves as competent to write on topics related to the treatment of animals, hence the theory that obviously had to be included in scientific veterinary treatises was the one that was dominant in general medical treatises. Hence, it is not the contradictions between various writers that are of great interest to us, but rather their use of the lexicon that had set its stamp on scientific medical writing. The veterinarians adopted the stance of Ibn Sīnā, who said that they were free of the obligation to prove the medical theory, an obligation that applied only to philosophers.³⁵

To what extent did the theory influence the practical treatment of hunting birds, and particularly their feeding and medication? The falconer of the Fāṭimid Caliph al-ʿAzīz billāh, who is quoted by many Mamluk writers, sharply criticizes older treatises that recommend various types of food as suitable for hunting birds, such as fat glands, meat of puppy dogs, mice, rats, bees,³⁶ and criticizes falconers of his own period for following the instructions in these books. According to this author, the feeding of hunting birds had to take into consideration their temperament. He states that phlegm is the dominant humour not only in hawks but in all species of hunting birds and even in cheetahs, and that this is the reason for their illnesses. He explains that the dominance of phlegm comes at the expense of blood, which explains the small quantities of blood in their bodies. As proof of this he suggests an experiment—killing a goshawk and measuring the blood that flows from its body. This quantity, he said, would be even less than that found in the body of a pigeon chick, whereas a common

³⁵ Ibn Sīnā, *al-Qānūn*, vol. I (book 1), pp. 17, 23.

³⁶ “ودع ما ذكر في الكتب من اطعمته في القرنصة الغدد وجراء الكلاب ومخاليف الخطاطيف والفار والجرذان” *و*“جلود الحيات اليابسة والزناير الحمر اليابسة ولحوم العجاجيل وأشباه ذلك” al-Ḥasan b. al-Ḥusayn al-Bāzyār, *al-Bayzarah*, p. 75.

kestrel (*bāshiq*) would be found to have less blood than a sparrow (*ʿusfūr*).³⁷ In fact, all the explanations of this author come to emphasize the importance of feeding hunting birds with the meat of animals with a hot temperament, and also of giving them blood matching their temperament. For example, he states that snake skins are not suitable food for hawks, in contrast to what is written in the earlier books, because the nature of snakeskin is dry, which does not suit the moist nature of the hawk. Concerning medications, the same author expresses his shock at the prescriptions that include poisonous ingredients that might endanger the life of anyone who used them, even if the poison was weakened by being mixed with other substances. Noting that such poisonous substances are harmful even to large animals such as camels (causing, for example, serious damage to the liver), he expresses surprise that books containing such prescriptions are preserved among the treasures of kings, who guard them carefully.³⁸

Al-Baladī quotes experts on hunting birds who state that the temperament of the Saker's stomach is phlegmatic and moist,³⁹ therefore they should be fed meat with a dry temperament, just as hawks with a stomach full of moist humour⁴⁰ have to be fed meat with a dry temperament like doves and other fowl.⁴¹ However, al-Baladī does not agree with the sweeping statement regarding the moist temperament of all hawks, and assumes the existence of differences in temperament due to individual differences between hawks.⁴²

The theory of the temperaments and the humours led to some methods of treatment that were frequently used in human medicine. It is common knowledge that various forms of bloodletting were very common among those who treated humans, and they were performed not only to treat diseases but also as a popular technique for preserving a good state of health. These methods were based on the Galenic theory, the principle of

³⁷ Al-Ḥasan b. al-Ḥusayn al-Bāzyār, *al-Bayzarah*, p. 75.

³⁸ *Ibid.*, pp. 75-76. As the author does not mention the names of these treatises, it is hard for us to know which treatises he refers to, but it is clear that they were accessible during his time and that his criticism is based on the things he had read in them.

³⁹ Al-Baladī, *al-Kāfi fī al-bayzarah*, p. 187.

⁴⁰ *Ibid.*, p. 186.

⁴¹ Among the types of meat listed as having a dry temperament that is suitable for feeding falcons with a moist temperament, we find the meat of birds like the *shaḥnūn* (Turtledove, *Streptopelia turtur*), *fākhīyah* (Collared dove, *Streptopelia decaocto*), and *Qaṭāh* (Sand grouse, *Pterocles orientalis*). See *Ibid.*, p. 186. Galen is the writer most quoted as saying that the increase of blood, phlegm, and air in the hawk's body is the main cause of its sicknesses. See *Ibid.*, pp. 232-233.

⁴² *Ibid.*, p. 186.

which was to maintain the balance between the humours of the body by the external intervention of letting blood. Animals were also treated by these methods, along with various laxatives, based on the same theory. It is hard to determine to what extent the veterinary practise took into consideration the four humours theory or whether the development of medications was firmly grounded in veterinary theory. However, it seems that practical professional considerations tended to supersede the theory, as will be expounded in Chapter VII. Animal diseases were generally attributed to the effect of the humours when no other solution was found, especially in the case of severe illness whose causes were not visible, such as rabies, which was ascribed to black bile, or other diseases that were named after the humour that was thought to be their cause, such as the Black Death (bubonic plague) or yellow fever.⁴³ Yet not one of the veterinary authors ignores the theory of the temperaments and humours, especially in regard to birds not all of them give it a central place in their books. The thirteenth-century writer, Ibn Qushtumur, who worked in the area of Iraq and not within Mamluk territories, stated that his lack of knowledge concerning the science of the temperaments led him to write very briefly about diseases of hunting birds defined as originating in disturbance of the balance between the humours.⁴⁴ Abū Bakr al-Bayṭār, in his books, implies that practical experience takes precedence over these theories, which he seems to present simply out of lip service.

C. ANATOMY

1. *Anatomy of the Horse*

The knowledge of animals' anatomy in the classical Greco-Roman culture surpassed the knowledge of human anatomy, and this knowledge reached the Islamic culture through the translation movement (see chapter II). The objection to dissection of human corpses was not unique to Islam.⁴⁵ The

⁴³ See on a falconry treatise written by an anonymous author (thought to be Ibn al-Ḥashshā') for the Ḥafṣī Caliph (ruled H 646-675/ CE 1249-1277), Ibn al-Ḥashshā' (attributed to), *al-Manṣūrī fī al-bayzarāh*, p. 180; According to al-Ḥasan al-Bazyār, rabies changes the temperament of the human who is afflicted by it to the temperament of a dog. See Al-Ḥasan b. al-Ḥusayn al-Bāzyār, *al-Bayzarāh*, p. 146. on the diseases known as the black and yellow diseases and their treatment, see Abū Bakr, *Kāshif*, vol. II, pp. 127-129; Ibn Hudhayl al-Andalusī, *Ḥilyat al-fursān*, p. 69.

⁴⁴ Ibn Qushtumur, *al-Qānūn al-wāḍiḥ*, K.K., Ms. 978, fols. 87v^o-88r^o

⁴⁵ 'Abd al-Nāṣir Ka'dān, *Ilāj al-kusūr 'ind al-aṭibbā' al-'arab*, Aleppo: Dār al-Qalam, 1990, p. 26 [Manqūl 'an Baḥṭh lil-Duktūr 'Abd al-Karīm Shḥāda ilā al-Nadwa al-'Ālamīyah

Jewish, Greek, and Roman cultures, and later the Christian culture, saw the sanctity of the human body as a supreme value, and this, perhaps, was the main reason for their avoidance of dissecting corpses. Examination of some passages from Muslim religious texts shows that while the human body is held sacred, in the sense that it must be buried immediately after death, the bodies of animals are not seen in this way. The fact that it was (and is) permitted to eat the meat of dead animals in most cultures, both pagan and monotheistic, is fundamental to this approach. One of the consequences of this is the vast knowledge accumulated on the anatomy of animals. It would be no exaggeration to say that knowledge of animal anatomy, physiology and pathology flourished long before the knowledge of human anatomy at the expense of the sacrifice of many animals.⁴⁶

In addition to the classical sources, anatomical knowledge on the horse was also based on information handed down from pre-Islamic Arab traditions and incorporated in the rich descriptions that became an integral part of the greatest poetry in the Arabian peninsula, and was later passed on to the Islamic tradition during the consolidation of the literary framework of the *Adab*. Such descriptions formed the basis for the development of the anatomical material that appeared in veterinary treatises of the Mamluk period. More than any other book, the treatise on horses by the Yemenite king, al-Malik al-Mujāhid, abounds in quotations from the early Arabic sources. This writer devotes a long chapter to a description of the horse's body, mentioning the Arabic name of every part of its anatomy

al-Ūlā li-Tārīkh al-ʿUlūm ʿind al-ʿArab bi-ʿInwān “Aḏwā’ alā al-ṭabīb al-ʿarabī wa-al-ʾālim al-mawsūʿ ʿAbd al-Latīf al-Baghdādī].

⁴⁶ With regard to anatomical science, writes Tsaknakis, Aristotle's profound perceptions show that he was a pioneer in this field. This is manifested in his classification of animals into two categories: with blood (ἐναιμα) and without blood (ἄναιμα), a classification corresponding to our distinction between vertebrates and invertebrates. He laid the foundation for general anatomy and histology with his theory on the ὁμοιομερή and the ἁνομοιομερή, that is, the tissues and the organs respectively. Aristotle recognized the importance of studying comparative anatomy and he is regarded as its founder. According to Tsaknakis, Aristotle was also the first to apply scientific criteria to veterinary medicine and to see it as part of the totality of medical knowledge. A contemporary of Aristotle's, Diocles of Carystus, who was known in Athens as “the new Hippocrates,” dealt, among other things, with animal anatomy. His book, *On Anatomy* deals to a large extent with the anatomy of animals, and is perhaps the oldest Greek treatise on the subject. However, Tsaknakis argues that the use of animals in research, especially anatomy, was of little interest to Greek doctors from the time of Hippocrates until the Alexandrian school. In Galen's period, animal anatomy was the only anatomical field that could be investigated thoroughly, and he even stated that he had managed only twice to see a human skeleton while he was studying in Alexandria, and therefore he focused on animal dissection. See Τσακνακης, *Ιστορία*, pp. 99-122.

from head to feet. Beyond these explanations, which are essentially linguistic, the author pinpoints the precise location of every organ in the body, describes the anatomical link between adjacent organs, and adds to this a description of the ideal form of each body part.⁴⁷

To illustrate the Arabs' rich anatomical knowledge of the horse's body, here is an example from al-Malik al-Mujāhid's treatise, describing the structure of the head and its parts:

The horse's whole head, with all its parts, is called in Arabic *al-na'āmah*, and includes *al-qawnas*, a protruding bone that joins the two ears and is located above the part known as *al-ʿuṣfūr*, where the arteries end. The two ears are called *al-ḥurraṭān* and *al-sāmi'atān*. The tip of the ear is called *dhubāb*, the outer [?] ear, *matn*, and the inner ear [?], *ṣaḥn*. Broad ears are the best, therefore one should choose horses with such ears. As to the length of the ears and their shape, it is better if they are long, but not too long, pointed, erect, delicate and thin, with dainty folds.⁴⁸

The writer adds more and more descriptions of each detail in the shape of the ear, its folds, the hairs growing inside it, and more. Thus, an overly long ear is called *al-shufārīyah*, *al-zu'ayrāt* is a thick, hairy ear, *al-muḥawbarah* is an ear full of hairs on the inside, *al-kazmā'* is a short ear, *al-daḥwā'*, an ear that nearly touches the other ear and is droopy, *al-khadhwā'*, an ear that droops from the base, *khadhḥā'*, an ear that is folded inwards, *qanfā'*, an ear folded outwards, *ra'lā'*, a split ear, *sharmā'*, an ear that is a little split at the tip, *qaṣwā'*, an ear that is more deeply split, *jad'ā'*, an ear more than a quarter split, and an ear that is split even more than this is called *'aḍbā'*. Clearly, these detailed descriptions indicate the great importance that was ascribed to the shape of the ear, which served as a criterion in determining a horse's nobility.⁴⁹ The shape and length of the forelock were also important in determining the horse's nobility.

As for the horse's face, *wajh*, al-Malik al-Mujāhid discusses its general shape and emphasizes that a horse with a thin, even scrawny, face without a layer of fat, so that the skin is stretched taut, is preferable. A horse with a thin nose is also to be preferred. The best type of forehead—*jabhah*—is broad with taut skin and no sign of excess fat. Another part of the face he mentions is *al-waqb* or *al-qilt*, eye socket, which is also called *nuqrah*. This part should be narrow, so that the eye will be sharp-sighted, in the words

⁴⁷ Al-Malik al-Mujāhid, *al-Aqwālal-kāfiyah*, pp. 141-160; See also some examples of anatomical presentation of the horse in various manuscripts in figures 24-26. For comparing with analogous presentation of the human body, see figures 27-29.

⁴⁸ Al-Malik al-Mujāhid, *al-Aqwālal-kāfiyah*, pp. 142-143.

⁴⁹ *Ibid.*; Ibn Hudhayl al-Andalusī, *Ḥilyat al-fursān*, p. 40.

of the source. Among the parts that make up the eye, the writer lists the bones that protrude above the eye sockets, *al-ḥijājān* (sing. *ḥijāj*), which he defines as equivalent to the eyebrows in the human face. The eye itself is composed of a part called *muqlah*, the “oily” part that contains the colours back and white, namely the eyeball. *Al-hadaqah* is the large, circular, black part of the eyeball, the iris; *al-nāẓir* is the small black circle in the eyeball, the pupil, and *al-insān* is also in the eyeball.⁵⁰

As regards the ideal shape and colour of the eye, strong colours are preferred, thus the black should be very dark, the edges should be free of any blemish and the gaze should be upwards. There are many terms describing the various kinds of gaze of the horse, as well as the different shapes of all the parts mentioned here. For example, looking sideways with one eye, expressing pride or anger, is known as *shazr*, eyes with eyelids that do not close are *shawṣ*, a prominent eye is called *jāḥiẓah*, an eye with a black spot inside the white is *mankūtah*, a white spot in the black is called ‘*ashwā*’, which is also the name for an eye that does not see in the dark, a weak-sighted eye is called *dawshā*, and an eye that squints is *hawlā*.

With regard to the nose, al-Malik al-Mujāhid refers mainly to the different shapes, his preferred one being the upturned nose, called *al-muṣaffah*. The other shapes are less desirable, and even considered ugly, for example, *aftas*, a flattened nose, or *khuns*—a nose shaped like that of a cow. Another ugly shape he mentions is the crooked nose, *al-qanā*. The area where the nasal bone joins the forehead is called *al-khulayqā*,⁵¹ and the writer states that this area, too, should be without excess fat. *Al-nāḥiqān* are the two cheekbones, which are located below the eye sockets. The soft area on both sides of the nose bone is *al-samūm*, which should also be narrow, delicate and free of fat. *Al-nāẓirān* are the two arteries (‘*irqān*’) located on both sides of the nose. *Al-marsan* is the area where the bridle is placed, with *al-ḥikma*, which includes the curb bit, the mouthpiece, the tongue and cheek gag. *Al-mustaṭ’am* is the name of the whole mouth area including the *jaḥāfil*—the lips. *Arnabah* is the cartilaginous part between the nostrils at the tip of the nose. This part served as one of the criteria for determining a horse’s nobility, according to whether it was soft and narrow or coarse and wide. According to the Mamluk sources, when a noble horse was born with excessively narrow nostrils it was customary to perform surgery to widen

⁵⁰ Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, pp. 144–145.

⁵¹ In humans it is called ‘*al-arnīn*’. See Ibn Manẓūr, “Kh-l-q.,” *Lisān al-‘arab*, vol. X, pp. 90–91; Abū ‘Ubaydah, *Kitāb al-Khayl*, pp. 16, 20–21; al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 146.

them and repair the flaw.⁵² The cheek is called *khadd*, and the ideal cheeks were broad and smooth, without a layer of superfluous fat. The shape of the cheeks was also a criterion in judging a horse's nobility. *Al-māḍighān* is the base of the cheeks, in the place where the molar teeth, *aḍrās*, grow. The mouth consists of the lips, called *juhḥultān* (sing. *juhḥulah*) in the case of horses. The preferred lips were thin, soft and delicate. The space between the lips and the forelock, *al-nāṣīyah*, was a major criterion in assessing a horse's nobility. Al-Malik al-Mujāhid does not mention a precise measurement, but insists that it should be a large space. One of the signs indicating lack of nobility in a horse is short thick lips, called *al-kazm*. The hairs growing on the lips are called *al-fīd*. *Al-shidqān* is the oral cavity, which contains the teeth—*asnān*, including the molars—*ḍurūṣ*. On the matter of teeth, the author points out that every hoofed animal has four *rabā'iyāt* (incisors), arranged in a row; two upper and two lower *thanāyā* (canine teeth); four *qawāriḥ* (premolars); four *anyāb* (premolars/molars), are located behind the *qawāriḥ* and eight *aḍrās* (premolars/molars)—are located behind the canines. Another tooth mentioned is *al-rāwūl* (wolf tooth), which is described as superfluous. The parts of the tongue are described as follows: the free outside end is called *al-'adhbah*, and its inner base is called *al-'ukrah*, or *al-'ukdah*. The blue arteries in the underside of the tongue are called *al-ṣurān*. Inside the oral cavity is the pharynx (larynx), *al-ḥanjarah*, also called *al-ḥalq* or *al-ḥulqūm*. *Al-ghalṣamah*, which is described as a sort of bone protruding from the throat, and must correspond to the crop.⁵³

This detailed description of the parts of the head is just one example of the linguistic wealth of the Mamluk veterinary writers, garnered from many treatises by Muslim writers who had acquired their knowledge from the early Arab heritage. We may assume that those who engaged in horse medicine had to know the name of every part of the body, as well as the signs indicating a good healthy organ or a defective, ugly or sick one. It is worthy of note that the anatomical information, describing in detail the parts of the horse's body and naming the diseases that might affect each part, was accompanied by abundant illustrations from Arabic veterinary manuscripts,⁵⁴ which leads us to the conclusion that everyone who planned

⁵² Al-Malik al-Mujāhid quotes some verses describing the width of the noble horse's nostrils. See al-Malik al-Mujāhid, *al-Aqwālal-kāfiyah*, pp. 146-147. On the practical side of medical methods and treatment, including surgical procedures, see in the following chapters.

⁵³ *Ibid.*, pp. 146-148.

⁵⁴ See illustrations of miniatures from veterinary manuscripts of various periods depicting the external structure of the horse's body and naming the diseases that attack

to engage in veterinary medicine had to become highly adept in this knowledge.

Alongside the *Jāhili* and the Islamic heritage, the veterinarians of the Mamluk period also had recourse to classical treatises translated from Greek or Syrian to Arabic. However, it may be that scholars somewhat exaggerate the importance of the classical and Byzantine medical sources for Muslim veterinary science. A comparison of a fourth-century CE treatise by Theonnestus with Arabic treatises on the subject shows that the contents of the veterinary treatises of the Mamluk period are incomparably richer in the aspects of anatomy, treatment and diagnosis. The few researchers of the history of Muslim veterinary medicine emphasize that general medical treatises, particularly that of Ibn Sīnā, were what mainly served as the theoretical scientific basis for veterinary treatises. According to these scholars, whether the veterinary writers knew Ibn Sīnā's material from the primary or from secondary sources, his impact on the understanding of the living body was decisive.⁵⁵

2. *The Blood Vessels*

As is well known, before the discoveries of the blood circulation in the sixteenth and seventeenth centuries, medical theories were largely dependent on the Galenic theory of blood movement. This is also reflected in the medical writings of medieval Islam. Basically, these writings distinguished between "vessels with pulse" (*urūq ḍawārib*), sometimes called *sharāyīn*, and "vessels without pulse" (*urūq ghayr ḍawārib*). The term *warīd* (pl. *awridah*) is also sometimes used to denote blood vessels originating in the liver and the spleen.⁵⁶ The confusion arising from the use of different terms in these writings is often considerable, and this is also true of Mamluk veterinary writings dealing with the blood vessels of animals. Interestingly, it was precisely during the Mamluk period, that Ibn al-Nafīs (d. 1288) suggested, in his comment on Ibn Sīnā's *Qānūn*, an unorthodox theory related to what is now termed the lesser or pulmonary circulation of the blood,

each part. Figures 30-32. For an analogous depiction of the human body, see figure 29.

⁵⁵ Reinhard Froehner, "Die Tierheilkunde des Abu Bekr ibn Bedr," *Veterinärhistorisches Jahrbuch*, VI (1931), pp. 1-150; Dunlop and William, *Veterinary Medicine*, pp. 190-191. Moulé, *Histoire de la médecine vétérinaire*. It is worth noting that direct quotations from Ibn Sīnā often appear in veterinary manuscripts. See, for example, Bodl. L., *MS. Arab. d. 208*, fol. 4v°.

⁵⁶ Ibn Sīnā, *al-Qānūn*, vol. I (book 1), p. 34; Ullmann, *Islamic Medicine*, pp. 64-69.

yet his unorthodox criticism of accepted theories remained largely unheeded by his contemporaries.⁵⁷

Of all the bodily systems described in the veterinary literature, the writers placed special emphasis on the blood vessels (*al-ʿurūq*), describing their location and origin. The reason for this is that most diseases in the Middle Ages, whether chronic or short-term, were treated by bloodletting, hence the need to know the names and location of different vessels, and which of them could be bled. The descriptions also refer to the method of bleeding, giving precise details of the manner of holding the needle and cutting the skin with a scalpel in order to expose the vessel, the depth of insertion of the needle into the body, the amount of blood to be drawn and the purpose of the phlebotomy.⁵⁸

One of the writers who expanded on this subject was the Yemenite king, al-Ashraf ʿUmar b. Yūsūf al-Ghassānī, whose book includes a chapter in which he states: “The number of vessels (*ʿurūq*) in the horse’s body is 362, in addition to a large number of very thin hair-like vessels. Of all these he lists 32 from which it is possible to draw blood, four of which are located in the ‘hands’ and feet.”⁵⁹

Al-Malik al-Ashraf’s description of the blood vessels that can be bled is richer and more interesting than that of Abū Bakr, who worked in Egypt during the same period and took care of the Mamluk sultan’s horses, although he, too, devotes a chapter to the subject and describes the origin of the blood vessels in the liver, a fact that is not mentioned by al-Malik al-Ashraf. Abū Bakr states that not all of the 32 vessels mentioned by al-Ashraf are suitable for bleeding, but only 21 of them.⁶⁰ This, perhaps, indicates a difference between the methods of treatment used by veterinarians in Yemen and in Egypt. It appears that bloodletting was more common in Yemen, similarly to cauterizing, which will be discussed in the next chapter.

Although what mainly interested the veterinarians in respect of the blood movement was the precise identification of those blood vessels in

⁵⁷ Ullmann, *Islamic Medicine*, pp. 68-69; Max Meyerhof [J. Schacht], “Ibn al-Nafis,” *E.I.* 2, vol. III (1971), pp. 897-898.

⁵⁸ See, for example, al-Malik al-Ashraf, *al-Mughnī*, p. 161.

⁵⁹ *Ibid.* These four vessels are described as ‘most poisonous’ (*asammuhā*), and it is not clear from the text whether this refers to the high risk in drawing blood from this area or to some other damage that might be caused. But it may be that this is simply a copyist error, and that the original text read ‘fattest’, ‘thickest’ or ‘widest’ (*asmanuhā*), which seems more suitable to a description of the vessels in this part of the body.

⁶⁰ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 117.

the body that could be used for bloodletting, we often find more detailed descriptions of the blood system, including the origin of the vessels (*ʿurūq*), their ramifications, and their role in nourishing various organs in the body. For example, Abū Bakr al-Bayṭār entitles a chapter devoted to this subject: “*knowledge of what is in the body of the horse and the ‘vessels’ (ʿurūq) that are suitable for bloodletting and a description of their origin in the liver.*”⁶¹ The medical theory discussed above, which prevailed in veterinary medicine, pointed to the liver as an important organ in the body. Whereas other authors generally describe the main vessels that can be bled, saying that there is no need to describe the rest of the deeper ones, Abū Bakr describes the blood system more thoroughly, stating that the veins (*ʿurūq ghayr dawārib*) suitable for bleeding originate from the liver, emphasizing at the same time, the vital need for the arteries (*sharāyīn* or *sharānīn*) in the body and explaining their important role in nourishing the organs that they reach. Afterwards, he describes only those blood vessels that are relevant to the veterinarian’s work, namely, the veins, or as he defines them, ‘vessels without a pulse’, and makes no further mention of the ‘vessels with a pulse’.

Abū Bakr describes the two main veins that emerge from the liver. The first one, which emerges from the concave side, is called *ʿirq al-bāb*, the ‘vein of the door [of the liver]’, and the second one, which emerges from the convex side, is called *al-ʿirq al-ajwaf*—the ‘hollow vein’. He then describes in detail the further ramifications of these two veins and discusses their functions. The first vein branches into three in the liver and these branches go to the stomach bringing food only from the liver.⁶² The second vein, *al-ʿirq al-ajwaf*, bifurcates when it exits the liver; the smaller branch ascends, passing through the horse’s diaphragm, and there branches into four, as follows:

a) One vein divides into two, both parts of which pass through the chest, from right to left, along the sides of two pectoral protrusions which are called *al-fahdatān*. These two veins, which can serve for bloodletting from the chest, are known as *al-nāḥirān*.

⁶¹ *Ibid.*

⁶² *Ibid.* A treatise attributed to Wahab Ibn Munabbih gives a somewhat different description, and also describes the structure of the horse’s veins and arteries. This writer, too, states that the veins (*awridah* pl., *warid* sing.) emerge from the liver, while the arteries (*ʿurūq*) emerge from the heart. See Wahab b. Munabbih, *Kitāb fi ʿilm siyāsāt al-khayl*, B.N., Ms. Arabe 2817 (Suppl.ar. n° 993), fol. 26v°.

b) The second vein passes through the sternum (*al-qaṣṣ*) and reaches the abdominal partition (*murāq al-baṭn*), and from there divides into two veins called *al-maḥāzīm*, which can be used for bloodletting.

c) The third vein ascends and divides into two branches, going up both sides of the neck. One branch, the deeper one, is called *al-wadj al-ghāʾir*, referred to by veterinarians as *al-arnabī*. The second branch, which is closer to the surface, is called *al-wadj al-ẓāhir*, and it divides in the area of the lower jaw into several veins. Two, called *al-adhruʾān*, reach the tongue and pass along both sides of it. These two are used for bloodletting from the tongue. The deep vein (*al-wadj al-ghāʾir* or *al-arnabī*) ascends to the ears and there ramifies into a network of small narrow veins that are clearly visible to the eye and are called *shaʿb*. This vein returns downward towards the eyes and descends, dividing at both sides of the eye sockets into *al-bāzirkān*, or *al-nawāẓir*, which are also used for bloodletting. These ramify into a large number of smaller veins spreading around the eyes. One of them descends towards the nasal bone and bifurcates, going on both sides of the nostrils. These veins are called *maḥājir* and are used for bloodletting in treating the eye disease known as *ramad* (trachoma).

d) The fourth vein divides in the chest cavity and descends to the lower part of the neck, where it again splits into two, both parts of which pass under the elbows. These veins are short and they ramify into many veins; two of them, which are particularly large, descend towards the knees, where they are called *ʾirqay al-bāṭinayn*, and also *al-ṣāfiyayn*, and serve for bloodletting. The rest of the veins pass through the visible outside of the arms, continue towards the upper elbow (*zind*), and on to the curved edge of the lower *zind*, and from there to the pastern (*rusgh*), on the outside. These veins are called *al-waḥshīyān* and can be used for bloodletting.

Returning now to the “hollow vein” (*ajwaf*), Abu Bakr writes that its larger part, called *ʾirq al-bāb*, descends towards the lower part of the body, also divides into two. One branch reaches the kidneys, where its role is to absorb the urine from the kidneys and carry it to the two ureters—*al-unthayān*. The other branch of this vein passes along the vertebrae and splits into three: the middle one passes directly along the tail and is used for bloodletting, *al-ʾājiz*. The other two pass through the inner parts of the thighs, from right to left, *bawāṭin al-rijlayn*, and then, above the hocks, *ʾarāqīb*, they ramify and continue along the inner and outer sides of the gaskins (hindlegs), reach the elbows, *rusghān*, another area from which blood can be let, known as the external veins of the legs (*waḥshīyāt*).

Here Abū Bakr concludes the chapter in which he provides all the necessary information on the horse's blood vessels. We may assume that this knowledge was designed to teach veterinarians the "arteries without a pulse," as he defined them; namely, the veins that were important mainly for treatment by bloodletting. Like al-Malik al-Ashraf, he enumerates 21 such veins,⁶³ and for added emphasis he repeats their names all together at the end of the chapter, an indication that the book was intended for teaching and studying the material required for practicing the veterinary profession.

3. *Osteology of the Horse: Bones, Ribs and Teeth*

In the eighth chapter of his book, under the heading 'Knowledge of what exists in the body of the horse, such as bones, ribs, molars and teeth', Abū Bakr attempts not only to provide the reader with an osteological description of the various bones, mentioning the location of each bone in the skeletal system, but also to discuss the different roles of the bones in the general body structure. His systematic description of the horse's skeleton is outstanding compared to that of other authors of veterinary treatises.⁶⁴ He begins by explaining the advantage resulting from the existence of many different bones in the body, and notes the benefit that the horse derives from it.

a) The profusion of bones allows the body to use one bone instead of another that is injured. The existence of many bones in the same part of the body enables the body to use healthy bones instead of broken ones. If a bone is damaged by some disease, or a fracture focused in the same bone, the healthy bone fills the functions of the one that is damaged and out of action.

b) The large number of bones in the horse's body supports its motor ability. If the whole body was composed of only one bone, or all as one piece, the body would have to move as one solid block, which is clearly impossible.

⁶³ Two orbital veins (عرقى البازر نكين), two suborbital veins (عرقى المحاجر), two external jugular veins (عرقى الوداجين), two lingual veins (عرقى الأذرعين), two jugular veins (عرقى الناحرين), two saphenous veins (عرقى الصافين), two girth veins (عرقى المحزمين), two internal thigh veins (أربع وحشيات في اليدين والرجلين), four veins in the external side of the legs (عرقى بواطن الرجلين), and the caudal vein (عرق الذنب), Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 123.

⁶⁴ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, pp. 127-130. For the treatment of this subject by other authors, see, for example, al-Malik al-Mujāhid, *al-Aqwālal-kāfiyah*, pp. 141-159; al-Ṣāhib Tāj al-Dīn, *Kitāb al-Byṭarah*, pp. 75-91.

c) The hardness of the bones provides two benefits: first, the bones constitute the foundation of the body, and the foundation has to be firm in order to carry the horse's weight; second, the existence of a variety of bones protects the internal organs hiding beneath them, and thus helps to avert external injuries or any kind of damage. For example, the bones of the skull prevent damage that might occur to the soft areas of the head. Similarly, the ribs protect vital organs in the body, such as the liver and the intestines, because they are harder than the internal parts that they protect.⁶⁵

Like other writers of veterinary books, Abū Bakr lists the bones and their location in the body starting from the head downwards, as follows:

The skull (*dimāgh*) is composed of eleven bones. Abū Bakr presents seven of these in visual form by attaching a general sketch to the text.⁶⁶ The eleven bones are located in the front of the head. Another four bones are located at the back of the skull, and the author states that all these bones are joined together as one piece. The upper jaw contains eight bones arranged in the following order: two eye sockets, two cheekbones, two nasal bones, one between the nostrils, one that forms the base of the teeth and splits or separates from the cheekbones in the area of the jaw joint (temporomandibular), where the upper canines grow. The mouth contains 40 teeth and molars. The lower jaw is composed of two bones. The vertebrae include seven in the neck, twelve in the back, three in the pelvis or rump, and eight in the tail. The total number of ribs in the chest is fourteen, seven on each side; the sternum (*al-Qaṣṣ*) properly speaking contains eight bones; the back ribs number ten. One bone, called *labbah* or *al-'aẓm al-ḥunjurī*, is located in the upper part of the chest and its role is to protect the heart from injury. The shoulders contain two bones: the shoulder blades (*al-katifayn*). The elbows have two bones, known as *al-qaṣīrān*. There are two bones in the upper legs, four in the forelegs. There are 20 bones in the forefeet, known as *al-kharādīl*, and the same number in the hind feet, four

⁶⁵ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 127.

⁶⁶ *Ibid.*, p. 129. Abū Bakr depicts the structure of the bones by sketching a general schema which is described in several manuscripts. This method of explaining the anatomy and structure of the bones appears in many veterinary treatises, particularly those that discuss the horse's bodily structure. Abū Bakr's book contains several such illustrations. This tradition of illustrating books gained momentum in the Mamluk period and many manuscripts from the period have survived with their colourful miniatures. For a depiction of a horse's skeletal structure, see Wahab b. Munabbih, *Kitāb fi 'ilm ṣīyāsāt al-khayl*, B.N., Ms. Arabe 2817 (Suppl.ar. n° 993), fol. 26r° [see figure 26. For the skeleton of human body, see figure 28].

in the gaskins, four in the ankle (*‘arāqīb*), two bones of *al-sabaqān* (perhaps the knees or the patellas, according to the sketch in the manuscript), and two thigh bones. If we count all the bones mentioned by Abū Bakr we reach the sum of 188 bones in the horse's body.⁶⁷

4. Joints

Abū Bakr describes the functions of the joints in the horse's body. He enumerates 18 joints, as follows: four joints in each foreleg: 1) the ankle joint, called in Arabic *al-karsū'* or *al-rummānah*; 2) the knee joint; 3) the elbow joint, called *al-qaṣīr*; 4) the shoulder joint, or shoulder blade. The joints in the hindlegs are called: 1) *al-rummānah*, 2) *al-‘arqūb*—the hock, 3) *al-sabaq*, and 4) *al-ṣayyār*, the thigh joint. These are the 16 joints in the forelegs and hindlegs. The seventeenth joint is in the topmost vertebra in the neck, which is connected to the brain stem. This is the joint that enables the head to move left and right, up and down. The eighteenth joint connects the upper and lower jaws, enabling the horse to open and close the mouth.⁶⁸

5. Anatomy of the Eye

Abū Bakr states that the eye is composed of seven layers: *al-shabakīyah*, perhaps the retina, *al-mashīmīyah*, *al-ṣalbah*, meaning the hard or stiff, *al-‘ankabūtīyah* (the spidery), *al-‘aynīyah*, perhaps the lens, *al-qarnīyah*, perhaps the cornea, and *al-multahimah*, perhaps the conjunctiva.⁶⁹ He adds that between these layers there are other layers of humours (*ruṭūbāt*) that are unique to the eye. These are vitreous humour, *al-zujājīyah*, aqueous humour, *al-jalīdīyah*, and white or egg-like sclera, *al-bayḍīyah*.⁷⁰

The same author also describes the qualities or the nature of each layer, stating that the clearest layer is the one between the *‘aynīyah* (lens) and the *qarnīyah* (cornea), which are the clearest and hardest of all the seven layers. He adds that the hard texture of these two layers and their luster and limpidity make it possible to see the colour of the fluid underneath them, and thus diagnose the disease affecting the eye. He also refers to the

⁶⁷ Figure 26.

⁶⁸ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 133.

⁶⁹ Modern medical literature refers to nine layers of the horse's eye, apart from the optic nerves. These layers are: conjunctiva, cornea, sclera, anterior chamber, iris, retina, posterior chamber, pupil, and lens. It is hard to determine with certainty which of the terms mentioned in the veterinary literature describing the structure of the eye are equivalent to the modern terms. See *The Merck Veterinary Manual*, Eighth edition, 1998, pp. 350–359.

⁷⁰ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 23.

connection between the humours in the brain that pass to the eyes through the two nerves that connect them.⁷¹

Abū Bakr's anatomical description of the eye was not based on early veterinary medical knowledge. This appears from an examination of several early sources that have survived in manuscripts, in which we find no mention of the subject. For example, one manuscript, which includes Theomnestus's veterinary treatise on horses in Arabic, contains no material on the anatomy of the eye, nor does it contain any material relating to horses' anatomy.⁷² Similarly, Ibn al-'Awwām's book offers no information on this subject, although it summarizes in great detail the classical veterinary knowledge that was passed down to the Arabs. Therefore, Abū Bakr's description of the anatomy of the horse's eye and its many layers is worthy of consideration. It may be that he based his work on works dedicated to human medicine, such as those by Ibn Sīnā and his followers, who interpreted his work and added knowledge of their own.

The exchange of medical information on the anatomy of various organs is evident in Muslim medical sources, where we can find many details similar to those that appear in veterinary treatises as well as the use of identical terms to describe the organs, and above all in pharmacology, which will be discussed in the next chapter. At the same time, the veterinary treatises that deal with the anatomy of animals appear to be less strict in including all the items that appear in general medical literature, some of whose writers devoted entire treatises solely to ophthalmology. In one treatise from the thirteenth century we find a detailed description of the eye illustrated by a sketch showing all the layers and giving their names, which are similar to those mentioned by Abū Bakr.⁷³ There is no doubt that eye doctors, *kaḥḥālūn* (sing. *kaḥḥāl*), studied the anatomy of the eye more thoroughly than did veterinarians. Ibn Sīnā, for example, in his comprehensive medical treatise, which is regarded as the foundation of medical literature in Islam, devotes a whole chapter to the eye, describing its structure most comprehensively. In addition to the seven layers mentioned by Abū Bakr, he describes the connection between the different layers and

⁷¹ *Ibid.*, p. 25.

⁷² For the treatment of eye diseases, it is there suggested to use types of medications such as *Iqlīmyā*, honey, and so forth, which were used to prepare kohl. But alongside these he recommends using "strange" substances, such as the bile of a lame hyena or of a fox. See B.N., Ms. *Arabe* 2810 (*arab.* 1038), fols. 65r°–69r°.

⁷³ Figure 33 shows the structure of the human eye as it was known to the Muslim doctors in the Middle Ages. See also *Civiltà del Rinascimento*, Anno II/No. 10 (21)/ Ottobre 2002, p. 61.

also discusses the sources of their names, which generally derive from the form of the layer. For example, Ibn Sīnā explains that the layer called “spider” (*al-ankabūṭīyah*) looks like a spider’s web spun around the retina, the *shabakīyah*, whose name derives from the fact that it contains the part beyond the vitreous humour like a hunter’s snare trapping the prey. He also refers to the three humours later mentioned by Abū Bakr—the vitreous humour (*al-zujājīyah*), the aqueous (*al-jalīdīyah*), and the “egg-like” sclera (*al-bayḍīyah*)—by the same names that appear in Abū Bakr’s book. Ibn Sīnā also describes the blood vessels that feed the layers of the eye, their humours, the temperaments that characterize each part of the eye, as well as diseases of the eye and their treatment.⁷⁴

It appears that the writers on veterinary medicine did not enter into great detail when discussing the anatomy of organs on which the medical knowledge at that time did not permit accurate diagnosis and appropriate treatment of disease. In general, they merely suggested a few treatments, which basically consisted of rubbing certain types of creams and ointments around or in the eye, particularly various types of kohl.⁷⁵ The veterinary writers favoured efficiency and chose to describe anatomically those organs for which such knowledge was necessary in order to treat them properly, for instance, bones, skin, joints, ligaments, muscles, and hooves; that is to say, mainly external parts. On the other hand, these writers’ books contain much less reference to the bowels, stomach and spleen, and to delicate organs which could not be treated, such as the brain, the eyes and the ears.

6. *Anatomy of Birds of Prey*

The writers of hunting and falconry literature adopted the approach of the hippiatry writers, who named the parts of the horse’s body according to the early Arab heritage. Al-Baladī, for example, at the beginning of a chapter describing species of hawks and the signs indicating the nature of the hunting bird, mentions the names of the body parts of predatory birds, emphasizing that these are the terms accepted by Arabic philologists.⁷⁶ This reliance on philologists is important because this treatise was written in the sixth or seventh century of the hijra (12th -13th CE) and included new

⁷⁴ Ibn Sīnā, *al-Qānūn*, vol. II (book 3), pp. 949-1011 {في تشرح العين وأحوالها وأمراضها وهو أربع مقالات}.

⁷⁵ The methods of treatment and the use of kohl for treating various eye diseases of animals will be discussed in the next chapter. See also Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 391-393.

⁷⁶ Al-Baladī, *al-Kāfi fī al-bayzarah*, p. 75.

materials that had not appeared in any previous treatise and which apparently originated from the Byzantine or Persian medical literature. The body parts described are all external, and the writer places great importance on giving their names in Arabic. He refers, for example, to the shape of the hawk's eye sockets, a shape called *qalt*, quoting from a poem as evidence of this term.⁷⁷ He also quotes from a lexicon of other organs such as the beak, the *mansir* or *minsar*, with which the bird strikes the meat of the prey. A long beak is called *qanī* or *aqnā*, a term that also appears in a poem quoted by the author. The tip of the beak is called *mi'qaf* (needle) while the upper part, closer to the head and the base of the tongue, is called *mil'aqah* (the spoon). The Arabic writers also discuss the feathers, naming each group of feathers in the body. For example, the cheek or face feathers are called *saf'ah*, and the neck feathers *al-zubrah*. The base of the wings, the upper part of the shoulders, the shoulder blades and a little below these parts are called *al-daffatān* and *al-janbān*.⁷⁸

The wing feathers are the most finely differentiated linguistically. The names of the five feathers starting from the longest feather at the tip of the wing and the four on the inside of the wing are called *al-qawādim*. The five feathers after them are called *al-ṭawārid*. The feathers from the base of the wing to the *al-ṭawārid* are called *al-khawāfi*.⁷⁹ Two feathers at the tip of the wing before the *al-qawādim* are called *al-sikkīnān* (knives) because of their shape. The small feathers on the back are called *al-fawāshī*, the stomach feathers are called *al-washī*. The feathers below the chest are *al-kus'ah*, the tail feathers are *al-ḥaqībah*, the two feathers in the middle of the tail are called *al-'amūdān*, or *al-mudhinān*, and the two feathers on the outside tip of the tail are called *al-ghazālatān*.⁸⁰

As well as the detailed description of the feathers, we find the names of several other organs, such as *al-waṣīf*—the tarsus, *barāthin*—the claws or talons, *al-ju'ju'*—the breast bone, *al-kalbān*—the two bones that are connected to the back of the anus, called *madhriq*. As for the bird's craw (*ḥawṣalah*), the author emphasizes that this term should not be used because it refers to birds that feed on grains and seeds, while this part in

⁷⁷ The verse quoted describes the eyes of the bird sunken in rock and the chest covered in thick shining silk. "وعيناك قلتان في صخرة" "وصدر تغشى باستبرق" Al-Baladī, *al-Kāfi fī al-bayzarah*, p. 75.

⁷⁸ Al-Baladī, *al-Kāfi fī al-bayzarah*, pp. 75-76.

⁷⁹ In the classical dictionary, *al-Mukhaṣṣaṣ*, the author enumerates 20 feathers in the birds' wings, arranged as follows: 4 *qawādim*, 4 *manākib*, 4 *abāhir*, 4 *kilā*, and 4 *khawāf*. See Ibn Sidah, *al-Mukhaṣṣaṣ*, vol. VIII, p. 130.

⁸⁰ Al-Baladī, *al-Kāfi fī al-bayzarah*, pp. 76-77.

predatory birds is called *al-zuhruk* or *al-jaryā*. *Al-qanāṣah*, or *al-qurqubānah*, is the gizzard, and the author mentions another term, apparently related to birds of prey, *al-qārit*, meaning dry blood, though it is not clear exactly what he means.⁸¹

Most of the material on hunting birds is based on contents drawn from Greek sources. One of the Greek scholars quoted, Arsijānūs the wise, discusses the differences in the anatomical structure of various hunting birds. The work of one of the earliest Arabic writers on the subject, al-Ghaṭrīf, the earlier extant copies of which date from the Mamluk period, describes the Peregrine, the *shāhīn*, emphasizing its impressively strong chest (*man-sūjah bi-al-ʿaṣab majdūlah bi-al-laḥm*), noting that birds of this species are among the strongest due to their hard bone structure. The weak point in the Peregrine's body, according to al-Ghaṭrīf, is the structure of its legs and thighs, which are very thin and delicate, and because of this the Peregrine strikes the prey with its chest when hunting.⁸² Al-Ghaṭrīf does not ascribe importance to lightness of motion or flying ability. In a thirteenth-century falconry book by Ibn Qushtumur we find criticism of former falconers, whose ignorance of the secrets of surgery and the birds' anatomy resulted in numerous blunders in their treatment of birds and other animals.⁸³

D. PHYSIOLOGY

1. *Physiology of Animals as Described in General Medical Literature and Other Sources*

The distinction between anatomy and physiology does not represent accurately the manner in which these subjects were presented in the Mamluk medical literature, both general and veterinary, which did not distinguish clearly between the two. The general medical sources that discuss the human body include physiological material concerning animals. Many examples of this can be found in the book by Ibn al-Nafīs, where he refers to animals in the context of an analysis of the physiology of some of the internal human systems.⁸⁴ He explains in detail the structure of the digestive system, the function of each part and its location in the human body.

⁸¹ *Ibid.*, p. 75.

⁸² Al-Ghaṭrīf, *Kitāb Ḍawāri al-ṭayr*, p. 36.

⁸³ Ibn Qushtumur, *al-Qānūn al-wāḍiḥ*, K.K., Ms. 978, fol. 87r^o.

⁸⁴ See, for example, Ibn al-Nafīs, *Sharḥ tashrīḥ*, pp. 372-373, 393-395.

General medical treatises like that of Ibn al-Nafis are full of such contents, in which the authors provide detailed explanations of the functions of the various organs in the body. The guiding principle in most of the explanations is that there is no great difference between the human body and that of other animals, and in cases where there is a difference, they state it explicitly. Presumably this kind of information was regarded by veterinarians as purely theoretical material and it did not find a place in veterinary literature, at least not in such detail. Perhaps this was due to the educational background of the veterinarians, who ascribed little importance to purely theoretical material and placed most emphasis on the actual medical practise.

Besides general medical treatises, in which physiology is dealt with extensively, the subject also appears in a tenth-century philosophical tractate by the Ikhwān al-Ṣafā', in which we find an analysis of the various systems in the body, emphasizing the functions of each organ. The tractate contains a clear and simple description of the circulatory system and the distribution of the blood vessels throughout the body, including the fact that the blood is filtered in the liver. Bearing in mind that many of the medical discoveries related to the physiology of the living body are credited to modern technology, we cannot fail to admire the genuine endeavors of writers like Ikhwān al-Ṣafā' and Ibn al-Nafis to understand the functioning of the bodily systems according to a rational order. This was a breakthrough in medical knowledge. In referring to the stomach, they write that its function is to push the remnants of food from it into the small and large intestines. The remnants exit through an opening designed for this purpose, while the pure and fine material, *kīmūs*—gastric juice, is passed to the liver to be broken down further and undergo another filtering process. After this process, the various humours penetrate the organs that are ready to receive them, such as the spleen, the gall-bladder, the heart, the liver, and the hollow arteries, which are like rivers and streams inside the body and their function is to carry the clean blood to the other parts of the body.⁸⁵

Ibn Sīnā does not differentiate between the human and the animal body, and places all the mammals in one category in explaining the functions of the various systems. He describes the major organs of the body, such as the heart, liver, and brain, as constituting the source of certain forces that operate the bodily systems. In his view, the heart is the source of energy,

⁸⁵ Ikhwān al-Ṣafā', *Rasā'il Ikhwān al-ṣafā wa-khillān al-wafā*, ed. 'Ārif Tāmīr, Beirut-Paris: Manshūrāt 'Uwaydāt, 1995, vol. II, pp. 279-301.

the “life force,” the brain is the source of the senses and of movement, and the liver is the source of nourishment. Each of these three organs is served by secondary organs. The lungs and the arteries serve the heart and help it to function optimally, the nerves and the digestive organs serve the brain, and the stomach and the network of veins serve the liver.⁸⁶

Ibn Sīnā expands further on the digestive system, saying that its function begins from the moment that food enters the mouth and is chewed by the teeth, and continues until the food is excreted through the anus. He explains the changes that occur in the composition of the food, describing the various components that pass through the digestive tract, which consists of the mouth and the teeth, the esophagus, the stomach, which he calls the “kitchen of the food,” the diaphragm, the duodenum, the pancreatic duct, the pancreas, the small intestine and the large intestine. Ibn Sīnā refers to the liquids secreted in each of these organs and describes their function in the digestive process, with special emphasis on the role of the gall-bladder in digestion.⁸⁷ He also explains the functioning of the heart, emphasizing that this organ moves inside the body in an irrational manner. He rebuts the argument that the heart is a muscle, saying that, although it resembles a muscle, it functions differently.⁸⁸

2. *Physiology in Mamluk Veterinary Treatises*

The Mamluk veterinary treatises describe the anatomy and physiology of the horse as similar to those of humans. Abū Bakr, for example, emphasizes the similarity between human beings and horses, saying that the horse resembles man in four different categories of bodily organs:⁸⁹

- a. ‘Respiratory organs’, *naḥsānīyah*, which include the nostrils, the windpipe (trachea), and the heart.
- b. ‘Animal organs’, including the head, liver, bladder, kidneys, urethra, and the male genitals.
- c. ‘Complex organs’, such as the arms, legs, and brain.

⁸⁶ In describing the functions of the bodily systems, Ibn Sīnā differs from Aristotle, who writes that the sole function of the brain is to cool the heart by secreting phlegm, the humour whose function is to prevent overheating of the body. See ‘Ādil al-Sayyid Aḥmad, *al-Islām wa-al-ṭibb al-bayṭarī*, p. 41.

⁸⁷ Ibn Sīnā, *al-Qānūn*, vol. I (book 1), pp. 34–36; vol. II (book 3), pp. 1233–1236, 1327–1329.

⁸⁸ *Ibid.*, vol. II (book 3), pp. 1195–1196; ‘Ādil al-Sayyid Aḥmad, *al-Islām wa-al-ṭibb al-bayṭarī*, p. 41.

⁸⁹ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 85.

- d. 'Similar organs', such as bones, cartilage, nerves, tendons, flesh, muscles, skin, and hair.

Apart from this classification of organs according to their functions, there is another classification, called *al-quwá*, referring to the action of the senses in the body. The authors who present this approach determine that the horse has nearly the same five senses as man, listing them as hearing, smell, taste, sight, and memory. They do not mention the sense of touch, which the horse does not share with man. In an attempt to explain the functioning of the body, these veterinarians compared the human and the animal's body, and this comparison yielded some scientific insights. At the same time, there is no doubt that the accumulated knowledge on animals' bodies, which greatly exceeded the knowledge on the human body due to the "sanctity" of the human body, was an important factor in the development of the sciences of anatomy and physiology in veterinary medicine.

3. *The Digestive System*

The digestive system is the only bodily system that is not only described extensively in the literature but is also discussed in the context of the actual practise of veterinary medicine. For example, the digestive system of birds of prey is described with great precision because the expert falconers and those who treated hunting birds understood that the intense activity that characterized these small birds required constant consumption of energy obtained from food. The method of feeding, which included frequent meals, derived from these experts' understanding that the digestive process of these animals was very quick, a point that is stressed in all the veterinary sources. The thorough descriptions of the digestive system in falconry and hawking treatises include the faeces of hunting birds, which are compared to human excreta. The writers conclude that the matter discharged from the bird's anus, *dharq* in Arabic, is urine, like human urine, while the undigested food vomited from the craw (*ḥawṣalah*) is defined as faeces and compared to the human's excretion of faeces.⁹⁰ This kind of understanding of the bird's digestive and urinary systems through comparison with these systems in the human body indicates lack of basic knowledge of the bird's digestive system, in which there is no separation between the two systems.

⁹⁰ For example, the Fāṭimid falconer, al-Ḥasan b. al-Ḥusayn, writes: "You should know that the *dharq* of a predatory bird is equal to the urine excreted from the human body, and its examination is like the examination of urine by a doctor who specializes in human medicine, and the *dharq* is even more reliable." Al-Ḥasan b. al-Ḥusayn, *al-Bayzarah*, p. 79.

Perhaps this lack of knowledge resulted mainly from the absence of external organs through which the bird could be seen excreting urine. At all events, it appears that this confusion in defining the systems caused no damage in terms of medical treatment.

It emerges from falconry and hawking treatises that the physiological knowledge of the digestive system focused mainly on the times allotted for feeding and excretion, from the moment when the food entered the mouth until it was expelled from the body. Knowledge of the times set for the passage of food through all the parts of the digestive system, including the pharynx, the stomach and the intestines, until the expulsion of the digested food products from the large intestine though the anus, was very important in terms of treatment, which was based largely on the times of feeding and the kinds of food. The writers also displayed knowledge of other systems related to digestion, such as the function of the craw, the gullet, and the stomach, but it should be emphasized that this knowledge was based largely on observation of external bodily functions, particularly those connected with various excretions,⁹¹ along with accumulated experience passed down through the generations.

4. *The Limitations of Veterinary Physiology*

General medicine regarded the human body as similar to that of other animals, hence there is no mention of significant differences between the physiology of the horse and that of man or any other mammal. This is reflected in the use of the same terms to describe human physiology and that of other mammals. However, since the science of physiology was less developed in general medicine, this was also the case in veterinary literature. Apparently the guiding principle of the veterinary writers was to provide practical information that could answer all the concrete questions, including methods of diagnosing animals' diseases, medications and methods of treatment. Scientific theoretical punctiliousness, intended to explain the functioning of the systems in the body, was not the major concern of the animal doctor, hence these materials were largely absent from the veterinary books. In addition, some of the statements found in veterinary books,

⁹¹ Falconry treatises generally rely on the statements of Galen and other classical doctors, who emphasized the importance of examining the body wastes as the best way of diagnosing states of sickness and health. In the treatment of falcons, the writers enumerate nine bodily excretions of the falcon which the doctor has to examine. See, for example: al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, pp. 74, 79-80; al-Baladī, *al-Kāfi fī al-bayzarah*, pp. 230-231; Kashājim lists only six. Kushājim, *al-Maṣa'id*, pp. 116-117.

claiming that the source of an illness is in internal organs such as the liver,⁹² kidneys,⁹³ heart,⁹⁴ lungs,⁹⁵ intestines,⁹⁶ or the functions of various organs, are somewhat obscure and attest to lack of knowledge concerning the human body. For example, Abū Bakr's explains that the veins that emerge from the liver are "responsible for the supply of food both to the liver and to the rest of the body."⁹⁷ There is no explanation of the various organs connected to this system, such as the heart and the lungs, and no reference to the function of organs such as the kidneys, the spleen, or the liver itself.

The thirteenth-century Ibn al-Nafis (d. 1288), who is considered one of the greatest doctors of his time, discusses the body from an anatomical and physiological viewpoint in his important book *Sharḥ tashrīḥ al-qānūn* ("Explanation of the anatomical analysis in the book *Al-Qānūn* by Ibn Sīnā"). In this book he refers to the variety of opinions on the anatomy and physiology of the human body as described in Ibn Sīnā's book, which constitutes the basis for most of the medical books in Islam. Indeed, Ibn al-Nafis intended in this book to explain Ibn Sīnā's analyses, particularly in the chapter dealing with the latter's treatment of anatomy and physiology in his *Al-Qānūn fī al-ṭibb*, but he also refers critically to the descriptions and explanations of his predecessors. He even differs in some cases with the greatest doctors, who were considered unquestioned authorities, and corrects them regarding the structure of certain organs. However, as already noted above with respect to his theory of blood circulation, his innovations apparently had no impact on veterinary medicine, and it is doubtful whether they had any influence on the general medicine of his period.⁹⁸

To sum up this section: the examination of Mamluk veterinary treatises reveals a gap between the anatomical knowledge possessed by the Mamluk veterinarians and their knowledge of physiology and the functioning of the various bodily systems.⁹⁹ There appear to be four main reasons for this:

⁹² Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 87-89, 315.

⁹³ *Ibid.*, pp. 93-94.

⁹⁴ *Ibid.*, p. 91.

⁹⁵ Abū Bakr states that there is a connection between the lungs and the heart, and that the lung is what leads air to the heart, but he does not expand on this. See *Ibid.*, pp. 91-93.

⁹⁶ *Ibid.*, pp. 85-86.

⁹⁷ *Ibid.*, vol. I, pp. 117-123.

⁹⁸ Ibn al-Nafis, *Sharḥ tashrīḥ*, pp. 5-6, 384-385; Ullmann, *Islamic Medicine*, pp. 68-69; Max Meyerhof [J. Schacht], "Ibn al-Nafis," *E.I.*², vol. III, pp. 897-898.

⁹⁹ In figures 24-25, for example, we see the paucity of details depicting important internal parts of the horse's body, as opposed to the rich depiction of the external parts shown in figures 30-32.

A. Advanced knowledge of physiology did not exist in the classical sources that were translated into Arabic, nor in other sources that served as the basis for all the early Islamic veterinary treatises.

B. In general medicine, too, the physiology of the human body was the weakest branch of medical science during the Middle Ages.

C. The attempt to know and understand how the various bodily systems work requires sophisticated instruments that did not exist throughout the Medieval period. In fact, it was only in modern times that physiological knowledge developed to a great extent, due to technological inventions and innovations in the realm of medical instruments.

D. The theory of the four humours and the efforts devoted to determining the temperament of the body and the organs in it largely hindered the development of the study of physiology. Every attempt to understand how the various systems worked in the living body was incorporated into the explanations that matched the theoretical framework of the four humours. Therefore, it may be assumed that more complex functioning of various systems in the body, such as the working of the brain, the electrical conduction of the nervous system, the ramified circulatory system, the process of oxygenation, and so forth, all remained unsolved mysteries to them.

E. TAXONOMY, BREEDS AND PEDIGREES

1. *The Nobility of the Horse*

The classical Arabic writers differentiated between noble (*ʿitāq-ʿirāb*) and non-noble (*barādhīn*) horses.¹⁰⁰ The authors of veterinary literature relied mainly on the early Arabic writings, especially those of the *Ḥadīth* (from the mouth of the Prophet Muḥammad), in order to give more validity to their statements. The existence of many traditions testifies to the importance of the subject in Muslim society, but the different versions of the traditions concerning the characteristics of the purebred horse only add to the confusion, and even raise doubts. As well as descent from a noble lineage, the horse's nobility was largely judged by its external physical description, such as size, proportions, general colour, markings, and so forth. Due to the many versions, it is hard to determine which shapes or colours were preferable.

¹⁰⁰ Eisenstein, "Überlegungen zu einer Darstellung der Rolle des Pferdes, p. 108.

Only horses that met all these requirements were granted the highest status and served as the standard for attribution of noble status to their descendants. Large sums were paid for sires with all these characteristics, and they were very much in demand for breeding purposes, especially by some Mamluk sultans, for whom they were the crowning glory signifying their elevated status. Such aristocratic horses were called *'itāq* (sing. *'atīq*), and are often referred to in veterinary treatises by names and appellations taken from the classical Arabic heritage, although it is hard to say how knowledgeable these veterinarians were in all the terms related to determining a horse's nobility or the names used to describe the range of colours, markings, and other signs mentioned in this chapter. Nevertheless, this information occupies an important place in all the veterinary treatises of the Mamluk period.

The great endeavors invested by the Mamluk sultans in purchasing noble horses called for expert knowledge on the part of the court veterinarians, who had to give their professional opinions on the nobility of a horse offered for sale, for which the sultan was prepared to pay a huge sum. The veterinarians' judgment had to be based on profound knowledge of genealogy and breeds, including familiarity with all the technical linguistic terms referring to external physical features and character traits of horses. At the beginning of the chapter describing the noble horse (*'atīq*), Abū Bakr stresses the importance of judging by the criteria that he lists, because it is an ancient Arab tradition from the *Jāhiliyah*, when they already distinguished between noble and non-noble horses, and he finds support for his statements in the poetry of the great *Jāhili* poets. In Islam, too, according to Abū Bakr, the nobility and pedigree of the horse was very important, particularly because the Prophet Muḥammad preferred pedigree horses and ruled that a horse belonging to the noble Arabian breed was entitled to two shares of the booty, while a horse that was not purebred and fought in a battle was entitled to only one share.¹⁰¹ Abū Bakr saw this as important because it was also related to the art of mounted warfare, a subject that he dealt with extensively. In his book he describes the characteristics of purebred horses, starting with their physical ability and stamina. According to him, a noble horse also consumes less food and water, which gives it a great advantage during a long military campaign or hunt. He also emphasizes

¹⁰¹ A noble horse was either one born to two Nabatean parents or a horse called *muqrif*, the opposite of *muḥajjan*. It appears from these traditions that the question of the horse's nobility or its racing skills was not simply a matter of esthetics but also concerned the sharing of the spoils of war. Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 308 (note 3).

the unique features of a purebred horse, such as the speed of breathing, width of the face and nostrils, length of the neck and strength of the base of the neck and shoulders, size of the thigh bones and pelvic bones, strength and firmness of the hooves, and so forth.¹⁰² In this way, he determines that the natural character of a noble horse cannot be separated from its physical attributes, and only the existence of both together confirms the judgment that it is noble. Hence, there are no intermediate levels, or misleading signs of partial nobility, horses are either noble or not.¹⁰³

Al-Malik al-Mujāhid explains the differences between the various terms related to the nobility of the horse. His explanation helps the reader to understand the philological terms that originated from the early Arab heritage, and thus he also illustrates the difficulty in determining a horse's nobility. The terms that he clarifies not only distinguish between thoroughbred horses and others, but also include terms indicating the absence of pure blood on the side of the mother or the father.¹⁰⁴

It would be pointless to quote all the traditions concerning the noble horse that were used by veterinary writers in attempting to establish criteria for judging a horse's nobility and pedigree, because their materials do not really clarify the criteria. However, there are some descriptions of people who were considered experts on the subject. In other words, this was not a wide-open subject that anyone could learn and practise, but a specialized discipline mastered by a few experts who were qualified to give opinions on a horse's nobility. One such expert, for example, was Salmān b. Rabī'a al-Bāhili, who was active during the times of the Caliph 'Umar b. al-Khaṭṭāb; he was even called *Salmān al-Khayl*, meaning Salmān of the horses, due to his expertise in this field.¹⁰⁵

¹⁰² *Ibid.*, p. 305.

¹⁰³ This statement by Abū Bakr contradicts the explanations of Eisenstein, who asserts that there are intermediate levels of nobility in horses. See: Eisenstein, "Überlegungen zu einer Darstellung der Rolle des Pferdes," p. 108.

¹⁰⁴ Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 160.

¹⁰⁵ The test he used was to offer the horse water to drink in a shallow bowl and observe its manner of drinking and the extent to which it bent its knees. According to some traditions Salmān al-Khayl's decisions were not always liked by the horse owners and led to many disputes when people questioned his authority before the ruler. For example, he determined that a mare belonging to the son of an important poet, 'Amrū b. Ma'd Yakrib al-Zubaydi, was not purebred although that mare, whose name was al-Kāmilah (perfection), was the daughter of a famous horse called al-Ba'th. The poet wrote a poem decrying Salmān, arguing that he understood nothing about thoroughbred horses and that his mare was noble and the daughter of nobles. This affair came to the knowledge of Caliph 'Umar, who threatened the poet and ordered him to take back his words against Salmān, who was an emir appointed by the Caliph. See *ibid.*, p. 165.

2. The Horse's Body Structure and Physiognomy

The first principle in the veterinary profession was the veterinarian's duty to be expert in the physiognomy of horses, *firāsah*, which was defined as a science in the full sense of the word, to which most veterinary treatises devoted a special chapter.¹⁰⁶ The application of physiognomy to the body was not unique to veterinary literature, and was based on principles from the field of medicine and the general sciences that were applied mainly to the human body.¹⁰⁷

Several writers summarize the physical characteristics of the noble horse, emphasizing the erect head, raised ears, broad nostrils, prominent eyes, broad flanks, large and broad belly and pelvis, long thighs and short gaskins.¹⁰⁸ Another tradition adds more criteria, such as the colours of the coat, eyes and hooves; the width of the rump, jaws, nostrils, forehead, thighs, between the thighs (*qtāh*) and the base of the neck; the length of the knees and neck; the pointing of the ears; the strength of the muscles and the folds in the arms, knees (or ankles); the delicacy of the face (*al-ḥukmah*) eyelids, and lips (*al-mustaṭ'am*).¹⁰⁹

Like other writers, Abū Bakr states that one of the most important criteria of *firāsah* is the horse's external appearance, including the state of its skin, head, and all the body parts in order, as well as the hooves of the forelegs and hindlegs.¹¹⁰ Regarding the general appearance, he stresses the

¹⁰⁶ T. Fahd, "Firāsa," *E.I.*², vol. II (1965), pp. 916-917. See, for example, Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 323; Mu'allif Majhūl (Anonymous), *al-Jawād al-'arabī*, p. 44; al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, pp. 161-171.

¹⁰⁷ See Antonella Ghersetti, *Il Kitāb Aristāṭalis al-faylasūfī l-firāsa nella traduzione di Hunayn b. Ishāq*, Quaderni di Studi Arabi: Studi e testi, 4, Università Ca Foscari di Venezia, Rome, 1999.

¹⁰⁸ See, for example, al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 166.

¹⁰⁹ One tradition, recounted by a woman named Asmā', daughter of Khārijah al-Fazzār, who was one of the first generation of Islam and a confidant of the first Caliphs, describes the physical characteristics of a noble horse, emphasizing the size, shape and proportions of certain parts of the body "رجب الكفلين، رجب الحوافر، صافي العينين، صافي الحوافر، رجب الكفلين، رجب الفرس صافي الاديم، صافي العينين، صافي الحوافر، رجب الكفلين، رجب الفرس صافي الاديم، رجب الشواذق، رجب المنخرين، طويل الفخذين، طويل العنق، محدد الاذنين، عريض الجبهة، عريض القفا، ضخم المقلة، ضخم الرولة، عبل الذراعين، عبل الاوظفة، دموع المرفقين، رقيق الارنبه، رقيق الجفون، رقيق الحكمة، رقيق رقب" —A horse, whose skin colour, eyes and hooves are pure, whose rump, jaws and nostrils are wide, whose haunch and neck are long, whose ears are pointed, whose face and buttocks are large, whose eyeballs and upper thighs are big, whose forearms and slender part of forelegs are muscled, whose elbows are thin, and whose tip of nose, eyelids, chin groove and mouth are slender, *Ibid*.

¹¹⁰ Before listing the criteria for determining a horse's nobility, Abū Bakr explains the importance of the subject for the veterinarian's work, saying that the veterinarian (*bayṭār*) and the *zardaḡ* need this knowledge, particularly when they are asked for a professional opinion and are consulted concerning the purchase of animals, and they are expected to

importance of the proportions of the body parts and their harmony. For example, a horse with a big body should not have a thin delicate neck or a small head; the proportions of the forelegs and hindlegs should be examined to ascertain that their length and breadth match the size of the body. Abū Bakr does not merely give a general description but adds more details describing the undesirable characteristics of various parts of the body.¹¹¹

After mentioning all the parts, al-Malik al-Mujāhid again sums up the characteristics of the *ʿatīq* horse in a chapter devoted to a description of the ideal characteristics of horses. In fact, he repeats all the same physical qualities but this time he arranges the body parts in different categories, ranging between sharp, narrow, wide, thick, soft, and other features.¹¹² This refers to all those physical characteristics that can be discerned when the horse is tied and in the stable and without any further examination. The examination of the horse's walking or running gait necessitates other criteria relating to its movements and behaviour while being reined in or given free rein by the rider.

Ibn Hudhayl al-Andalusī, in his book on horses, explains *firāsah* as a very broad science, stating that its purpose is to help people choose the best horses. He emphasizes that it is necessary to examine the horse in different situations, getting up, lying on the ground, running, cantering, and galloping. Thus, *firāsah* requires examination of the horse in every position.¹¹³ He cites an example of a mistake in judgment that might occur when a person determines the horse's characteristics solely on the basis of its external appearance just after it has emerged from a pool of water, which improves its appearance, the softness of its coat and even the pricking of its ears. Similarly, *firāsah* of a colt is problematic because its body is in a state of development, and its proportions change for the better or worse when it reaches maturity.¹¹⁴ Nevertheless, Ibn Hudhayl agrees with the experts on *firāsah*, who set a number of physical characteristics as a hard and fast rule for determining the nobility and quality of a horse. Among

discover any defect that exists in the horse's body. Due to the importance of the subject, he says, and in order to make it easier for the reader, he has concentrated all this material in one chapter dealing with discernment and diagnosis of the horse's condition, although the information appears here and there in many other chapters of the book. See Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 335.

¹¹¹ See figure 22, depicting the outward appearance of the preferable horse.

¹¹² Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, pp. 172-177.

¹¹³ Ibn Hudhayl al-Andalusī, *Hilyat al-fursān*, p. 71.

¹¹⁴ *Ibid.*, pp. 71-72; al-Ṣāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, pp. 107-109; Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 323.

these are the harmonious proportions of the body parts, primarily the head (a small head being considered as an advantage), the length of the neck, erectness of the ears and their length, delicacy, width, and folds, the length of the cheeks, their delicacy and softness, the forelock, the width of the forehead, protrusion of the eyes, acuity of vision, width of the nostrils, and so forth.¹¹⁵

The veterinary writers also attempted to compare horses belonging to different geographical regions. Abū Bakr calls this kind of evaluation *ḥadhw al-dawāb*, and in a chapter devoted to it he lists the breeds of horses and discusses their physical characteristics and their distinguishing marks. The best horses, he states, are the 'Arabian horses', which he calls *Ḥijāzīyah* because they came from the Ḥijāz region, in the centre of the Arabian Peninsula. He emphasizes that these horses are black and they have the most beautiful eyes. Their unique beauty is also expressed in the front of the face and the jaws, as well as the lips. Their ears are pricked up. These horses are noted for their strong hooves and also for the quality of their elbows—*arsāgh*. Another pure breed belongs to a different part of the Arabian Peninsula, Najd. These horses are known for their long necks, lean cheeks, rounded heads, broad bellies and hindquarters, thin gaskins, and big strong thighs. Unlike the horses from the centre of the Arabian Peninsula, the horses of Yemen are characterized by rounded bodies, big rugged legs, narrow hindquarters, and short necks. The Syrian horses, writes the author, have the most beautiful colours and are known for the delicacy of their hooves, their hairless foreheads, and big beautiful eyes. Another breed, called al-Jazīyah (after the region between the Tigris and Euphrates), has broad hairy hindquarters and hindlegs and very keen eyesight. The *Burqīyah* horses, which, according to the chroniclers, Sultan Qalāwūn preferred to the noble Arabian horses because of their low price, had coarse rough skin, a very strong chest, a large head, and big broad legs and hooves. Egyptian horses had long necks, pointed ears, delicate legs, with elongated thighs and sparse body hair.¹¹⁶ Abū Bakr refers to a defect in the hooves of these horses, and al-Malik al-Mujāhid remarks that they

¹¹⁵ Ibn Hudhayl al-Andalusī, *Ḥīyat al-fursān*, pp. 71-79. On the appearance of the horse that is defined today as Arabian see H. Eisenstein, "Überlegungen zu einer Darstellung der Rolle des Pferdes, p. 108. It is interesting to note that the same criteria of the Arabian horse's facial features are still used to determine various aspects of the horse's character, such as courage or timidity. See, for example: Linda Tellinton Jones, "Il Metodo del Ttouch [sic]: Trattati e Caratteri del Muso," *Il Mio Cavallo*, VII (Luglio 2004), anno 15, pp. 30-35.

¹¹⁶ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, pp. 317-319.

are the breed closest to the Arabian horses,¹¹⁷ adding that most of the Egyptian horses belong to this breed and they are imported to Egypt from the Burqah region.¹¹⁸ He emphasizes that the females of this breed are better than the males, but in general they are less fit than the Arabian horses. After gelding they become very effective for use in battle, which requires patience, calm and obedience. Horses from Abyssinia were regarded as undesirable and even ugly, and the Abyssinians rode them bareback without saddle or bridle, which added to the conviction that these horses were inferior. There were also horses in India, but their origin, according to the sources, was from Mongolia, and they were perceived as non-noble horses of the *Kūdan* breed. Regarding the noble Arabian horses in India, one author writes that they came from Yemen in the context of trade. He remarks that Arabian horses do not breed in the lands of the infidels, they become weak and live a much shorter life.¹¹⁹

Generally, the veterinary writers cite the same *Adab* anecdotes and early Islamic traditions relating to the division of spoils to noble horses. One such anecdote that appears in al-Malik al-Mujāhid's book tells of a blind woman whose son bought a noble horse, and when she asked him to describe the horse he did so in flowery language which gave little indication of the horse's nobility. For example, he said that viewed from the front the horse looked like a standing deer, while from the back it looked like a male ostrich. When his mother asked him to describe the horse further, he stated that it was born of noble thoroughbred parents.¹²⁰ Another tradition tells of a man from the Asad tribe who, when asked how a noble horse looked, replied that he distinguished between a noble and a non-noble horse by the fact that the latter had a nose with a broad tip, a thick neck, and was noisy and restless.¹²¹

¹¹⁷ Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 361.

¹¹⁸ Burqah is the name of a place in the desert west of Alexandria. In the geographical literature it is described as a border town with fertile soil and highly developed agriculture. Its inhabitants were religious people who were kind to strangers who passed their way. Burqah was also a border point for measuring the breadth of Egypt to Ilā (Eilat). See, for example, Abū 'Abd Allāh Aḥmad b. Muḥammad b. Ishāq al-Hamadhānī al-ma'rūf bi-Ibn al-Faqīh, *Kitāb al-Buldān*, ed. Yūsuf al-Hādī, Beirut: 'Ālam al-Kutub, 1996, p. 115; al-Maqdisī al-Buthārī, *Aḥsan al-taqāsīm fī ma'rifat al-aqālīm*, ed. Muḥammad Makhzūm, Beirut: Dār Iḥyā' al-Turāth, 1987, p. 186.

¹¹⁹ Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 362.

¹²⁰ *Ibid.*, 161-162.

¹²¹ وأما البطيء المقرف، فالدكوك الجبة، الضخم الارنية، الغليظ الرقة، الكثير الجلبة، الذي إذا أمسكته "قال أرسلني، وإذا أرسلته قال أمسكني" See *Ibid.*, p. 162.

When treating the choice of racehorse, special emphasis is dedicated to the general outline of the horse's body, because horse racing was one of the favourite pastimes in Muslim society in general and among the Mamluks in particular. Veterinary writers devoted separate sections to descriptions of the characteristics of horses that were expected to win races,¹²² focusing mostly on the external body structure.¹²³ The examination also included measurement of the distance between the steps of the forelegs and hindlegs, which served to estimate the horse's speed and predict its success in races.¹²⁴ Ibn Mankalī ascribes great importance to the choice of a very swift horse, and in this context he mentions the great love of al-Malik al-Nāṣir Ibn Qalāwūn for fast horses, especially those that had proved their physical skill and won races. He rejects the argument that the shape and nature of the hoof are what dictate the horse's speed, and claims that the ability to run quickly is what counts regardless of the shape or nature of the hoof.¹²⁵ Ibn Mankalī's explanations are based on the traditions concerning the horse's creation from the south wind, which endowed it with the quality of speed.¹²⁶

3. Horses' Colours, Stars, Markings and Whorls

The colour of horses was a subject of great interest to veterinary writers, and the numerous terms used to define the variety of shades often caused confusion in determining the preferred colour of the noble horse. The horses' colour also occupied the Arabs back in the *Jāhilī* period, and many poets of the time ascribed great importance to it, boasting of the special colours of their horses. This tradition continued with the advent of Islam and found expression in many sayings of the Prophet, who also attributed

¹²² Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 147; al-Ṣāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, pp. 141-142.

¹²³ According to Abū Bakr, a distance of six arms (*dhirā'*, pl. *adhru'*) length between the running horse's footsteps characterizes a fast horse who is likely to win races, and anything above this indicates an even more gifted horse. Three to four arms length indicates a slow horse, and between four and five arms length mediocre. See Abū Bakr al-Bayṭār, *Kāshif*, vol. I, pp. 147-149.

¹²⁴ Al-Malik al-Mujāhid repeats the measurements determined by Abū Bakr. He also provides the same measurements in different units (*qadam*), stating that the fastest horse is one with a distance between steps of about 12 *qadam*, with an average horse the distance between steps is 9-11 *aqdām*, and with a slow horse less than 9. He also remarks that he himself measured his own horses' footsteps and arrived at these measurements. See al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, pp. 177-178.

¹²⁵ Ibn Mankalī, *Uns al-malā*, pp. 86-87.

¹²⁶ *Ibid.*, pp. 87-88.

great importance to the horse's colour. The great variety made choice difficult, despite the tradition that a bay (*kumayt*) horse had the highest status among noble horses, but it is hard to say whether this colour was considered the most beautiful. Although some veterinary authors inclined more toward religious tradition regarding colours, as reflected in the fact that they cited this tradition a great deal, in coming to describe the various colours they enumerated all the advantages and disadvantages of all the horses and all their colours, including the bay. The multiplicity of different, and sometimes conflicting, traditions concerning the ideal colour of the horse testifies to the confusion regarding the reliability of these judgments. Abū Bakr, in a chapter devoted to the colours of horses, states that black (*adham*) is the best colour. He refers to the confusion on this matter, remarking sarcastically that many philosophers, whom he calls 'chatterers', claim that red is the superior colour.¹²⁷

Ibn Hudhayl al-Andalusī, for example, states that there are four basic colours: white, black, brown and yellow, but he later corrects himself, saying that there are actually only two basic colours, white and black, and all the other colours, including the red and yellow that he mentioned previously, originate from the white and the black.¹²⁸ Al-Malik al-Mujāhid, on the other hand, argues that there are eight basic colours of horses: *al-duhmah*—pure black, *al-khūḍrah*—green, *al-ḥūwah*—a shade of red, *al-kumtah*—reddish brown, *al-ṣufrah*, yellow, *wurdah*—reddish yellow (rose

¹²⁷ Abū Bakr cites a tradition that the best of all horses is black, *aqrah*, with a white patch in the center of its forehead (star) and white markings on its upper lip—*artham*, as well as on its two hindlegs and the left foreleg. If no such horse is available, one should choose a bay with all these markings “خير الخيل الادهم الاقح الارثم محجل ثلاث طلق يميني أغر بهيم” Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 237;” See also al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 112. According to a treatise attributed to Wahab b. Munabbih, the tradition tells of a man named Salmān al-Khayl, who asked for the Prophet's recommendation before buying a horse. The Prophet recommended as first choice a black horse with white markings on three of its legs (apart from the right foreleg) and a smooth forelock “أدھم محجل بثلاث مطلق البين سائل الغرة” As second choice he recommended a reddish horse (chestnut) with similar characteristics. See B.N., *Ms. Arabe 2817*, fols. 1v^o-2r^o. In al-Dimyātī's treatise the black horse is ranked as superior and the horse with three white legs ranked only second, and the red third “فان لم يكن” خير الخيل الادهم الاقح الارثم ثم المحجل طلق البين، فان لم يكن” See B.N., *Ms. Arabe 2817*, fol. 39r^o. Figures 22-23.

¹²⁸ Ibn Hudhayl al-Andalusī wrote the book *Ḥilyat al-fursān wa-shi'ar al-shuj'ān* for the ruler of Grenada, the Caliph of the Nāṣirite dynasty al-Musta'in billāh Abū Nāṣir Sa'd b. al-Manṣūr (ruled 1446-1454). This treatise, which was written in the mid-fifteenth century, summarizes and revises all the material relating to horses in the philological context. It focuses mainly on *furūsiyah*, and presents details of the weapons that were used at the beginning of Islam. See Ibn Hudhayl, *Ḥilyat al-fursān*, pp. 49-50.

colour), *al-shuqrah*—a shade of pure red, and *al-shuhbah*—white. He states that all the other colours and shades of horses derive from these eight basic colours.¹²⁹ In addition to these basic colours, some sources provide detailed descriptions of every colour and shade.¹³⁰

In the chapter on colours Abū Bakr adds information that does not appear in the earlier sources, mentioning some important distinctions regarding the designation of colours; for example, a white horse (*ashhab*) is designated to be ridden by kings.¹³¹ He also ascribes importance to the colours of the cloths with which the horse is covered, stating that a white horse should be covered with white cloth. That is to say, the cloak or *kiswah* should match the colour of the horse.¹³²

One tradition, for example, defines the noblest horse as deep black, with a white patch on its forehead the size of a dirham coin, white hindlegs and a white left foreleg. This tradition of the Prophet is mentioned in most of

¹²⁹ Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 111.

¹³⁰ For example, a pure white horse is called *‘ashshāb*, but this colour has countless nuances, ranging from pure white to a combination of the three basic colours first mentioned, e.g., white mixed with yellow, called *ashhab sawsanī*, reddish-white (*ṣunābī*), and white mixed with black (*ḥadīdī*). Al-Malik al-Mujāhid remarks that his Yemenite contemporaries use the term *akhḍar ṣāfi* (“pure green”) to note the pure white horse (*ashhab qirtāsī*). He states that a horse of this shade, called *būṣī*, is considered weak by the Arabs, whereas Indians and Persians prefer it. The black horse, called *adham*, also has a wide variety of shades, each with its own name, as well as markings of different sizes on various parts of the body. Among these names we find *ghayhabī*—deep black, *aḥwā*—greenish-black, and *adbas*—black mixed with a bright colour. Black mixed with white becomes grey, *awraq* or *akhabb*. Red, *aḥmar* includes the names *ward*—reddish yellow, and this refers to a horse whose general colour is pure red, while its mane and tail are black or dark. *kumayt*, the colour of turmeric, is a dark red or blackish red horse. If the red is more dominant, it is called *kumayt mudammā*, and if it is darker, it is called *aṣḍā*—rust red. A *kumayt* with a white mane and tail is called *ashqar*. The texts include quotations from several traditions of the Prophet referring to the *ashqar* horse as the best. The fourth and last of the basic colours according to Ibn Hudhayl, is yellow—*aṣfar*, and here we find intense yellow, *aṣfar fāqī*, the name given to a horse with yellow shining like gold, and if his tail and mane are white he is called *aṣfar fāḍīh*. This horse is generally considered weak. A yellow horse with a black mane and tail is called *aṣfar muṭraq*, and if he also has black arms and legs he is called *armad*. The horse known as *ablaq* has arms and legs of a different, darker colour, and it is said of this horse that he will not win a race. In addition to all these, there is *aṣfar a’far*, a horse with a yellow body and a black mane and tail. See al-Dimyāṭī’s, *Kitāb Faḍl al-khay*, B.N., Ms. *Arabe* 2816, fols. 37v°–43v°. See, also, al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, pp. 111–122. For the Arabic terminology of horse colours, see Janet C.E. Watson, *Lexicon of Arabic Horse Terminology*, London and New York: Kegan Paul International, 1996, pp. 21–24.

¹³¹ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 255.

¹³² *Ibid.*, p. 203.

the veterinary sources, therefore it presumably reflects the ideal.¹³³ In second place is the bay, *kumayt*, with the same markings on the forehead and legs. Both the general colour and the markings, particularly those on the forehead (*ghurrah*) and the legs (*tahjil*), were important criteria for determining the quality, nobility and pedigree of a horse, as well as its behavioural characteristics. Most of the Hadith traditions are quoted from the Prophet, granting them added value.¹³⁴ According to one writer, a horse such as that described above served as the basis for determining the nobility of its descendants. However, these colours alone did not suffice to determine a horse's nobility, and the horse also had to meet other criteria, including bodily proportions (which will be explained later) and physical skills indicating his ability to win races, and also to be very patient.¹³⁵

The Arabic word *shiyah* means every colour on the body of a horse or other animal that differs from its general colour, but it is generally used in relation to horses and refers to a light colour, especially white, on a horse of another colour.¹³⁶ Different names are used for horses with different kinds of markings. For example, a horse with white ears is called *adharr*; if the entire head is white the horse is called *asqa'*, and a white marking on the horse's rump qualifies it for the name *aqnaq*. A horse whose head and neck are entirely white is called *adra'*, and one with white hindquarters is *azarr*. A white-tailed horse is called *ash'al*.¹³⁷

A white marking on the horse's face (star) is called *ghurrah*. A very small marking, the size of a small coin (*dirham*) or less, is a sign of bad luck unless

¹³³ The tradition, quoted by Abū Qutāda, says "خير" أنه قال: "روى أبو قتادة عن النبي (صلم) أنه قال: "خير" الخيل الأدهم الأقرح المحجل ثلاث طلق اليمين، فإن لم يكن أدهم فكفيت على هذه الشية" *Ībn Hudhayl, Ḥilyat al-fursān*, p. 57; Abū Bakr al-Bayṭār, *Kāshif*, vol. I, pp. 237-241. See also figures 22-23.

¹³⁴ Below are some traditional sayings describing horses that were considered the best.

"خير الخيل الأدهم الأقرح المحجل ثلاث طلق اليمين، فإن لم يكن أدهم فكفيت على هذه الشية"

"عليك بكل كيت أغر محجل أو أدهم أشقر أغر محجل"

"الين في الخيل في كل أحوى أحمر"

"لو جمعت خيول العرب في صعيد واحد ثم أرسلت لكان سابقها أشقر"

"إذا اردت ان تغزو فاشتر فرسا أغر محجل مطلق اليمين فانك تسلم وتغنم"

"عليك به أدهم أقرح أرثم محجل ثلاث طلق يميني"

"روى عبيدة مرسلًا عن النبي صلعم: ان خير الخيل حوا"

See Ibn Hudhayl, *Ḥilyat al-fursān*, p. 57; Abū Bakr al-Bayṭār, *Kāshif*, vol. I, pp. 237-241.

¹³⁵ Ibn Hudhayl, *Ḥilyat al-fursān*, p. 59.

¹³⁶ This definition appears in al-Malik al-Mujāhid's book, and he adds that a horse without any patch of a different colour is called *bahīm* or *muṣammāt*. See al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 131.

¹³⁷ Ibn Hudhayl, *Ḥilyat al-fursān*, pp. 50-51.

there is also a white patch on another part of the body. Another name for a white marking on the horse's face is *najm*, meaning star in Arabic, and a horse with a star is regarded as the most purebred. If the marking covers the entire forehead the horse is called *ashdakh*. Face markings have many shapes and include a medley of colours, and this is what led to the use of so many terms to define them. Thus, we find that a circular marking with a different colour in the middle, a narrow patch that does not reach the eyes, a white patch on one cheek, a white patch on the upper lip, or the lower lip, or on both lips—each of these confers a different name on the horse.

Unlike Ibn Hudhayl, Abū Bakr al-Bayṭār groups *ghurar* (stars) and *shiyāt* (markings) in one chapter, mentioning only eleven types of *ghurar* and explaining that *shiyāt* is any white patch on the horse's face and legs.¹³⁸ A horse with no trace of a white marking is called *bahīm*, while a horse with white only on the face and head is called *bahīm muṣmat*. The name given to a horse with a white patch spreading and covering the eyes, and even reaching the cheeks on both sides, is *al-agharr al-a'shā*. Similarly, there are different names for horses whose stars spread to the eyelids, cover the eyelids, cover the forehead and not the nose, or cover the nose as well.

Tahjīl, from the word *hajl*, or *hijl*, meaning leg bracelet (*khilkhāl*), is the name for every kind of white marking on the horse's legs (white socks). Here too, every variation in size, shape and location on the leg confers on the horse a different name. A *mujayyab* is a horse whose marking reaches the knee (elbow) of foreleg, or hock of hindleg (called a stocking in English). If the white marking reaches the thighs and hindlegs, the horse is called *ablaq musarwal*,¹³⁹ while an *a'sam* has white markings only on the forelegs. A horse with markings up to the elbows on the forelegs and no markings on the hindlegs is called *aqfaz*. As mentioned, it is important where the patch is located, how high it is, and how much it covers, each of these determining the name given to the horse. An important term in this context refers to the presence or absence of *tahjīl* on the horse's hindlegs or forelegs.

¹³⁸ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, pp. 207–209.

¹³⁹ According to another source, *ablaq musarwal* is the name for a horse whose legs are entirely white, including the thighs and elbows “إذا تجاوز بياض التحجيل إلى العضدين والفخذين” According to al-Aṣma'i, *ablaq* refers to a horse whose white marking extends beyond the elbow and hock. *ablaq* is defined as any colour mixed with white, and it may appear with a variety of colours. See al-Aṣma'i, *Kitāb al-Khayl*, pp. 214–215; al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 136; Ibn Sida, *al-Mukhaṣṣaṣ*, vol. VI, p. 156.

A horse with such markings is called *mumsak*, and one without is *muṭlaq*.¹⁴⁰ A horse with white markings on the right foreleg and left hindleg or the reverse is called *shikāl*. Such a horse is considered undesirable, and some sayings of the Prophet indicate that he did not like such horses.¹⁴¹

The whorl, sometimes called *Nikhāl*, is also the name for a piece of jewelry or a necklace on the horse's body. This circular shape may appear on the face, the forehead, or any other part of the horse's body. Every circular patch of colour is known by a different name. In describing these shapes, called in Arabic *dawā'ir*, most of the veterinary authors rely on early sources, which enumerate eighteen types, some of them regarded as desirable and others not, and some listed without any aesthetic evaluation.¹⁴²

4. Donkeys and Mules

As with horses, some of the writers attempt to determine the nature and quality of donkeys and mules according to the countries and regions to which they belong.¹⁴³ In the case of mules, they say that those originating from Armenia are the best, followed by mules from the Maghreb. Sometimes we find favourable mention of mules originating from Andalusia. Yemenite veterinary sources also refer to mules and donkeys in an area of the region, stating that the best mules in Yemen belong to the San'a region.¹⁴⁴ As for donkeys, the Egyptians are reputed to be the best, especially those from the rural areas of Upper Egypt. Yemenite donkeys are ranked second to the Egyptians, and the Maghreb donkeys are rated worst. It is interesting to see that wild donkeys are also classified in the category of donkeys who arrived in Yemen as gifts from Mogadishu (the capital of Somalia today). The author writes that the Yemenites succeeded in training these donkeys for riding in the sultan's court.¹⁴⁵

¹⁴⁰ There are several variations on this; a horse with *tahjīl* on two hindlegs and one foreleg is called *muḥajjal thalāth* [triple *muḥajjal*] and left or right *muṭlaq*, depending on the foreleg that is without markings, and similarly in the case of one hindleg without *tahjīl*. As mentioned, *muṭlaq* refers to a part without white markings.

¹⁴¹ Ibn Hudhayl, *Ḥilyat al-fursān*, p. 54.

¹⁴² *Ibid.*, pp. 54-55; Abū Bakr al-Bayṭār, *Kāshif*, vol. I, pp. 297-299; al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, pp. 137-139; al-Ṣāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, pp. 130-131.

¹⁴³ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 329.

¹⁴⁴ Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 363.

¹⁴⁵ *Ibid.*, p. 374. Attempts to tame wild donkeys for riding as well as cross-breeding with horses were made in private farms and in some menageries, but the results were not satisfactory because the wild donkey is a highly-strung animal that is not easy to domesticate. See Albert C. Leighton, "The Mule as a Cultural Invention," *Technology and Culture*, vol. VIII, No. 1 (January 1967), p. 52.

Since the mule is a crossbreed (of a donkey and a mare), the sources refer to the breeds of the parents to examine their status. A mare of the *Rūmīyah* or *Biqāʿīyah* breed is the best mother, and as for the father (the donkey), they ascribe importance to his physical characteristics, such as the length and width of the ears and the healthiness of the body. Two such parents guarantee the birth of a big, sturdy mule with strong legs and the stamina to carry heavy loads. Open grazing areas are another important factor in raising mules. The sources emphasize that a hinny born of a female donkey and a male horse will have inferior physical characteristics, more like those of a donkey, while a female horse impregnated by a donkey will bear a mule that is more similar to a horse, since the size of the she-donkey's uterus does not allow for the growth of a foetus with the dimensions of a regular mule, unlike the mare's uterus.¹⁴⁶

Abū Bakr enumerates seven basic colours of mules and donkeys. In the case of mules he counts red, grey (*adgham*), bright chestnut (*ashqar*), white (*ashhab*), moon-white, bright or whitish (*aqmar*), alkālī, base or lye (*qilā*), and black or maroon bay [?] (*dayzaj*). As for donkeys, he lists some colours that are specific only to donkeys, such as greyish-red (*aṣḥar*), olive (*zaytūnī*), and stone-coloured (*hajarī*). He states that only a donkey can be called *zaytūnī* (olive), while a mule or a horse of a similar colour is called by a different name.¹⁴⁷

5. Camels

The various breeds of camels are discussed mainly in veterinary treatises by Yemenite authors, who distinguish between breeds largely according to the geographical areas that serve as their habitat. Like horses, camels are divided into two categories—noble and non-noble, and the breeds considered the best and designated for '*manākhāt*'¹⁴⁸ include names such as *al-mas'ūdī*, *al-manṣūrī*, *al-haikamī*, *al-muwallad*, *al-ḥalabī*, *al-arhabī*, *al-jabrī*, *al-najdī*, *al-aḥjan*. Breeds of a lower quality include *al-'udhrī*, *al-sārī'ī*, *al-surūrī*, *al-bazyarī*, *al-faḍwā*.¹⁴⁹ The writers describe every breed,

¹⁴⁶ Leighton, "The Mule as a Cultural Invention," pp. 45-52; Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 329; al-Malik al-Mujāhid, *al-Aqwāl-kāfiyah*, p. 363.

¹⁴⁷ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 283.

¹⁴⁸ The meaning of this word is not clear. Perhaps it refers to preeding. In the dictionary the verb '*manah*' appears in the sense of a she-camel who gives milk in the winter. See Ibn Manẓūr al-Afriqī, "m-n-ḥ," *Lisān al-'arab*, Beirut: Dār Ṣādir, 1968, vol. II, p. 607.

¹⁴⁹ Al-Malik al-Ashraf, *al-Mughnī*, p. 181. Al-Malik al-Mujāhid states that the Arabs in the *Jahiliyyah* made a point of mentioning the family connection and the lineage of camels, as with horses. They also knew the names of the camels' early ancestors, who were renowned

identifying them by their colours and physical characteristics such as the size and shape of the body, length of the ears, the neck, shape of the eyes, length of the tail, and thickness and softness of the coat. We sometimes also find a reference to the behaviour of a certain breed, as well as its endurance and its suitability for performing tasks based on the climate or the country in which it was raised.¹⁵⁰ As with horses, camels are classified according to their colour and their breed, which is generally related to a certain geographical region. In respect of colour, red camels are considered the best, both aesthetically and in terms of physical ability, which surpasses all the others. Some writers even compare a red camel to a bay horse, *kumayt*, emphasizing the sayings of the Prophet on this matter.¹⁵¹ Like horses, camels were named according to their colours.¹⁵²

The camel population included crossbreeds, known as *muwallad*, and the veterinary sources state that the best hybrid is a camel with one *Masʿūdī* parent. Unlike the purebreds, hybrid camels had a very broad range of shapes, colours, traits, behaviour, and stamina. Some other breeds that were not purebred were generally brought by sea, hence they were also called *al-Baḥrīyah*. One such was *al-Sawākinīyah*, from Sawākin, a coastal town near ʿĪdhāb. Although these camels were not counted among the noble or purebred ones, they were considered fit to be ridden by kings, being similar in physical form and in behaviour to the *al-Masʿūdī*. Among the names of non-noble camels we also find the *Zarʿīyah*, who were similar to the *Sawākinīyah*, *al-Azʿalīyah*, and *al-Barbarīyah*, who were brought from the Barbara region and other parts of Yemen, and the *Nūbīyah*, from Egypt, with very large bodies and small heads, who were excellent in battle due to their speed and strength.¹⁵³

6. Elephants

Veterinary treatises contain little reference to breeds of elephants, but one writer, al-Malik al-Mujāhid, does mention several breeds, classifying them according to their geographical origin, such as Abyssinia, India, and Armenia.¹⁵⁴ He discusses the differences between them, remarking, for

throughout the Arabian Peninsula and even mentioned in the works of the greatest poets. See al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 375.

¹⁵⁰ Al-Malik al-Ashraf, *al-Mughnī*, 181-183.

¹⁵¹ Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 381.

¹⁵² *Ibid.*, p. 382.

¹⁵³ *Ibid.*, pp. 388-389.

¹⁵⁴ *Ibid.*, p. 398.

example, that the trunk of Abyssinian elephants has a kind of appendage of two small fingers called *milqāt*, with which it grasps objects. This elephant's forelegs are longer than his hindlegs, which enables him to sit on his rump. He is also more docile than the Indian elephant. Al-Malik al-Mujāhid writes that the Indian elephant has five toes as opposed to the Abyssinian's four.¹⁵⁵ The Abyssinian elephants are smaller than the Indians, their skin is rougher and their bodies are less proportional. They are also more dangerous and even dare to kill humans.¹⁵⁶ Armenian elephants have bodies that recall saluki dogs with their firm bellies and swift running ability. Referring to the elephant's teeth, al-Malik al-Mujāhid quotes the Indians' explanation that these are not canines or similar teeth, because the elephant does not bite with them but gores, hence they are horn-like, similar to the horns of a bull. The females of the Indian breed have no tusks, while the females of the Abyssinian breed do.¹⁵⁷ Although this author does not discuss crossbreeds, he enters into explanations about breeding. For example, he refers to the powerful sexual urges of the males, which may be dangerous for their trainers during that period, because elephants in that condition become extremely aggressive. The female conceives once in three years and the gestation period is seven years [sic].¹⁵⁸ At the age of two years the young elephant, the *daghfal*, grows teeth, and at this age the mother tries to wean him. If the young one refuses to cooperate she is liable to take strong measures such as biting his tail or his ears, which could be harmful and even sever these organs.¹⁵⁹

7. Farm Animals

The place of farm animals in the veterinary literature of the Mamluk period is relatively marginal. This may seem strange, in view of the fact that these animals occupy a central place in the important book on agriculture by Ibn al-ʿAwwām, which predates the Mamluk period (12th century),¹⁶⁰ and in zoological works of the Mamluk period, such as the one written by

¹⁵⁵ *Ibid.*

¹⁵⁶ *Ibid.*, p. 403.

¹⁵⁷ *Ibid.*, p. 398.

¹⁵⁸ The Arabic zoological literature also states that the elephant's pregnancy last seven years. See, for example al-Damīrī, *Ḥayāt al-ḥayawān al-kubrā*, vol. II, p. 179; al-Jāhīz, *Kitāb al-ḥayawān*, Beirut: Dār Muṣʿab, 1982, vol. VII, p. 613.

¹⁵⁹ Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 399.

¹⁶⁰ Abū Zakarīyā Yaḥyā b. Muḥammad b. Aḥmad Ibn al-ʿAwwām al-Ishbīlī, *Kitāb al-Filāḥah*, ed. and trans. Josef Antonio Banqueri, 2 vols, Madrid: Ministerio de Agricultura, Pasca y Alimentacion, 1988 (originally published in 1802).

al-Damīrī (14th century).¹⁶¹ For example, chapter 31 in Ibn al-‘Awwām’s book includes a detailed presentation of all farm animals, including the ways of identifying healthy ones, as well as their breeding and upkeep. However, although this work reflects a rich zoological and practical knowledge, it contains only few references to medical problems and their treatment. Al Damīrī’s approach is mainly philological, literary and religious, and his book is interwoven with many anecdotes from early Islam. It does contain, however, information on the use of various animal parts to deal with human medical problems.¹⁶²

In the corpus of veterinary treatises that lies at the basis of the present study, on one—that by the Yemenite ruler al-Malik al-Ashraf, also includes farm animals—cattle, sheep and goats--- in his book. The introductory paragraphs deal with the terminology used in describing such animals according to the various phases of their life cycle. Their colours, which, according to this work reflect different qualities of these animals, are also discussed, distinguishing in this respect between males and females.

The physical morphology of oxen receives special attention, in view of their use for agricultural works: the strength of the legs, the animals’ height, the thickness of its neck and the form of its horns are noted as important characteristics in choosing a good ox for farming.¹⁶³

The main ailments of cattle, of sheep and of goats that are encountered in the area of Yemen are described in detail, accompanied by methods of treatment specific for each one of them.¹⁶⁴

8. Dogs

The veterinary literature on falconry and hunting includes extensive material on various breeds of animals, with references to the genealogy of some of them, particularly hunting animals such as dogs and cheetahs, as well as predatory birds trained for hunting. Ibn Mankalī enumerates five breeds of dogs.¹⁶⁵

1. *Al-Ṣaydī*, the best-known and most sought after hunting dog, apparently of the saluki breed. Presumably the name (*Ṣaydī*) indicates the characteristics of a dog with the best hunting skills.

¹⁶¹ Al-Damīrī, Kamāl al-Dīn Muḥammad b. Mūsā (d. 808 /1405), *Ḥayāt al-ḥayawān al-kubrā*, 3 vols., Tehran: Intishārāt Nāṣir Khasraw, 1415 H.

¹⁶² *Ibid.*, vol. I, pp. 208-215; 584-593; vol. II, pp. 83-86.

¹⁶³ Al-Malik al-Ashraf, *al-Mughnī fī al-bayṭarah*, pp. 212-213.

¹⁶⁴ *Ibid.*, pp. 214-219.

¹⁶⁵ See, for example, figures 8 and 12.

2. *Al-Zughārī*, also known as *al-Nashshāq*.
3. *Al-Ḥabak*, a breed not suitable for hunting, according to Ibn Mankalī, but it served the traders in the markets (*mukārīyah*), who for some reason preferred it to all the others, and apparently also trained these dogs to take part in street shows for children.¹⁶⁶
4. *Al-Dabīsī*, also known as *al-Zaghawānī*, a breed highly skilled to work as watchdogs in markets and villages and they also served as sheepdogs.
5. *Al-Mushabbah*, the breed that inhabited al-Rum—Byzantium. It evolved from the mating of two dogs of the *al-Ṣaydī* and the *al-Zaghrāwī* breeds, and inherited the characteristics of both. In appearance these dogs were smaller than the *al-Ṣaydī* but more noble than the *al-Zaghrāwī*.¹⁶⁷

As stated, the best hunting dogs were the saluki (listed above as *Ṣaydī*), this is often described in the sources as the purest breed and the Arabs used to keep a genealogy of their *Ṣaydī* dogs, as they did with horses.¹⁶⁸

The handlers of hunting dogs paid special attention to breeding and the choice of males and females for impregnation. Kushājīm states that the most appropriate age is two years. The author discusses also questions of dogs' physiognomy, *fīrāsah*, in order to help dog handlers to identify the best pups to be trained for hunting.¹⁶⁹ In this context we often encounter cruel methods of testing the mother, for example, she has to rescue her pups who are placed inside a circle of fire. The mother does not flinch from danger and runs to save her pups. The first pup that the mother chooses to rescue from the circle of fire is the one that is best and will become the most skilled as a hunter (*najīb*). The weight of the pup is also a criterion for evaluating its nobility, the heavier pup being more noble. According to another theory, a female pup that resembles its mother will be the best of the litter. One male in a litter of three will be the best. And best of all is a male born alone. Another test was performed to examine the pups' ability to stand on their feet on a damp surface, and the one that managed to stay upright on its feet and walk without falling was the best. Unlike horses, where colour played an important part in choosing a noble horse, in the case of dogs colour was solely an aesthetic factor.¹⁷⁰ In fact, some writers

¹⁶⁶ Ibn Mankalī, *Uns al-malā*, p. 144.

¹⁶⁷ Al-Asadī, *al-Jamharah fī al-bayzarah*, fol. 149v^o [Ibn Mankalī, *Uns al-malā*, note of the ed. Muḥammad Ṣālihiyyah, p. 144].

¹⁶⁸ Ibn al-Ḥashshā' (attributed to), *al-Manṣūrī fī al-bayzarah*, p. 160; Kushājīm, *al-Maṣāyid wa-al-maṭārid*, p. 131.

¹⁶⁹ Kushājīm, *al-Maṣāyid wa-al-maṭārid*, pp. 137–138.

¹⁷⁰ Among the colours of dogs mentioned, we find yellow, red, black, white, green, and grey, as well as some mixed colours such as *ablaq*, black and white, or *ʿūsīyah* and *ṣaḥar*,

state that dogs should not be chosen for their colour, because colour is not a guarantee of the dog's abilities or of its nobility. Preference for a certain colour may play an important part in the purchaser's choice, but in the realm of *firāsah* it is meaningless.¹⁷¹ Very rarely do we encounter mention of a dog's colour as indicating a particular characteristic, such as endurance of heat or physical strength. For example, we find a description of a black dog whose resistance to cold or heat was weak compared with a white dog, which was much more resistant, *fāriḥ*, particularly if its eyes were black.¹⁷² However, we do find a conflicting opinion, which asserts that a black dog is stronger, and even claims that every animal whose colour is black is stronger than any animal of its kind of any other colour.¹⁷³ Some authors mention the birth of different coloured pups in the same litter of saluki dogs, but beyond the question of breeds and crossbreeds there is no mention of colour being connected in any way with the characteristics of purebred dogs. This is surprising, because traditions dating back to the beginning of Islam feature several references to breeds of dogs, and one tradition even states that thoroughbred horses were chosen according to the model of thoroughbred dogs.¹⁷⁴

These conflicting opinions strengthen the writers' argument that the dog's colour has no special significance and the choice of a noble dog should be made according to the shape and condition of its various body parts.¹⁷⁵ Therefore, we find detailed descriptions of the dog's anatomical structure, with special emphasis on the proportions of the various parts, including the length of the legs, the general build, the shape of the tail, the fur, the head and eyes, the ears, nose, neck and so on.¹⁷⁶ An interesting point is the comparison of horses and dogs in terms of *firāsah* for the purpose of determining nobility (*najābah*). There is a clear distinction between the description of females designated for hunting and those chosen for breeding,

which are shades of reddish-brown. See Ibn al-Ḥashshā' (attributed to), *al-Manṣūrī fī al-bayzarah*, p. 165.

¹⁷¹ Kushājīm, *al-Maṣāyid wa-al-Maṭārid*, p. 137; al-Ḥasan b. al-Ḥusayn, *al-Bayzarah*, pp. 144-145;

¹⁷² Al-Ḥasan b. al-Ḥusayn, *al-Bayzarah*, p. 145; Kushājīm, *al-Maṣāyid wa-al-maṭārid*, p. 137.

¹⁷³ *Ibid.*

¹⁷⁴ Kushājīm, *al-Maṣāyid wa-al-maṭārid*, p. 137; al-Ḥasan b. al-Ḥusayn, *al-Bayzarah*, p. 145.

¹⁷⁵ Kushājīm, *al-Maṣāyid wa-al-maṭārid*, p. 137; al-Ḥasan b. al-Ḥusayn, *al-Bayzarah*, pp. 144-145.

¹⁷⁶ Kushājīm, *al-Maṣāyid wa-al-maṭārid*, pp. 136-137; al-Ḥasan b. al-Ḥusayn, *al-Bayzarah*, pp. 144-145.

and careful distinction between the females and males designated for the same purpose—chasing animals during the hunt.¹⁷⁷

9. *Cheetahs*

Ibn Mankalī cites the distinctions made by al-Asadī (12th century), who defined several breeds of cheetahs according to their geographical origin.¹⁷⁸ These were generally broad areas in which it was possible to find different types of cheetahs. Ibn Mankalī names the countries where cheetahs are to be found from the Maghreb in the west to Tibet in the east.¹⁷⁹ Among the cheetahs mentioned is a type called *Samāwah*, believed to inhabit the flat desert stretching between the town of Kūfah in Iraq and Syria. Cheetahs of this breed were considered the best for hunting by the circle method—*halaqah*.¹⁸⁰ Ibn Mankalī remarks that the Egyptian cheetahs are better and nobler than the *samāwah*, and the anatomical difference between the two breeds is expressed in the fact that the Egyptian cheetahs have longer bones but the *samāwah* are more attractive, most of them are white with hardly any spots, and the females are generally better than the males. Ibn Mankalī describes how the Syrian cheetah, while riding on horseback, sits upright behind his handler (*fahhād*) and towers above him.¹⁸¹ The faces of the Syrian cheetahs are described as dark. In Syria there are also other breeds of cheetahs, for example, one that is described as beautiful but unpopular due to its bad qualities, such as disloyalty, disobedience to its trainer and aggressiveness towards people. To distinguish between this breed and others in the same region, the author describes some external signs such as its red colour, broad tail, large head, very thick neck, large ears and thick legs. This cheetah is associated with another type in the Syrian region, the coastal cheetah, of which the author says nothing except that its colour tends to be black. It appears that the Syrian cheetahs were scattered throughout the area ranging from Antiochia to ‘Asqalān (Ascalon).

¹⁷⁷ Kushājīm, *al-Maṣāyid wa-al-maṭārid*, p. 137; al-Ḥasan b. al-Ḥusayn, *al-Bayzarah*, p. 145.

¹⁷⁸ In a chapter listing the breeds of cheetahs, Ibn Mankalī of the Mamluk period quotes al-Asadī, stating that he was the expert on hunting in the Ayyubid period. He also mentions having read that al-Asadī lived in the years “five hundred and something,” that is to say, in the sixth century of the Hij. (twelfth century CE). See Ibn Mankalī, *Uns al-malā*, pp. 129–134.

¹⁷⁹ *Ibid.*, p. 129.

¹⁸⁰ The writer does not explain this hunting method, but his use of the word *halaqah* suggests that it was a method in which the hunters and cheetahs made a kind of circle around the prey and gradually drew closer until the cheetahs were released to set on the prey. See *Ibid.*, p. 134.

¹⁸¹ *Ibid.*, p. 132.

Other breeds mentioned in Ibn Mankalī's treatise belong to various regions in Egypt. Among these are the Ṣadr cheetahs from the al-Kharāb region between Cairo and the city of Īlah (Eilat of today). He describes these cheetahs as varied in colour, some white, others red, and also some yellow. He also refers to cheetahs from the area of Alexandria, who are not as good as those from other parts of Egypt. Cheetahs from the area of Burqah are white and they are good for hunting white deer. The last type of cheetah described by Ibn Mankalī is attributed to Banū Salīm, and the author states that the members of this tribe hunt the cheetahs wandering in the deserts and sell them to the Mamluk rulers.¹⁸² These cheetahs are described as beautiful, with variegated colours such as red, white and yellow (but not black), with very short fur, and the author compares them to the breeds known as Egyptian, saying that the Egyptian cheetahs are better hunters and swifter, but the Banū Salīm are more beautiful and amiable.¹⁸³

10. *Hunting Birds: Hawks, Falcons and Eagles*

The identification and description of various species of birds that were trained to hunt occupies an important place in the falconry literature. It was necessary to give a separate name to every kind in order to help the hunters and bird tamers to learn the differences between them and choose the most suitable birds for the sultan or any other eminent person to whom they provided this service. For us today these names present a problem, because it is hard to establish precisely the identity of the birds according to the names as they appear in the sources of those times. However, although the detailed information on hunting birds and their identification that appears in professional falconry/hawking and veterinary books was not incorporated in the zoological literature, modern authors sometimes rely on the latter, especially on al-Damīrī's *Ḥayāt al-Ḥayawān al-Kubrā* (14th century, d. 1405/808), and associate Arabic names with the Latin ones that are used in modern taxonomy.¹⁸⁴ These identifications are often er-

¹⁸² He explains that these Arab tribes are as numerous as the damage that they do to the kingdom, therefore it is necessary to purge the country of them. This remark reflects the Mamluks' attitude to the Bedouin tribes who inhabited the region and were often described in chronicles of the period as enemies who wreaked a lot of damage on caravans of merchants and of pilgrims to Mecca, whom they robbed. A certain amount of skepticism is in order here, as there were many cases when the Mamluks carried out raids on these tribes in order to take their flocks as booty. See *Ibid.*, p. 134.

¹⁸³ *Ibid.*

¹⁸⁴ According to Möller, this practise characterizes the zoological dictionary of Amīn Ma'lūf (1932), and also to the ornithological textbook by al-Nujūmī (1950). See Möller,

roneous, because the meaning of the terms that appear in medieval sources was different. Detlef Möller, who investigated this subject in great depth, thought that the meaning of the hunting birds' names should be identified from the texts themselves, and that it is necessary to understand the conceptual approach on which the Arab falconers based their naming method. Their main criterion was to discern by different names types of hunting birds and not biological species. For example, they gave different names to male and female birds of the same species because their hunting characteristics were different.¹⁸⁵ If only the female of a particular species served for hunting the male was not given a name of its own; consequently a modern zoologist who would attempt reconstructing a systematic classification based on these sources would risk reaching erroneous conclusions. According to Möller, the Arab falconers followed their Persian and Greek teachers in classifying hunting birds into four groups, as follows.¹⁸⁶

1. *Bāz* or *bāzī*—Hawk
2. *Shāhīn* or *kūhī*—Peregrine
3. *Ṣaqr*—Saker
4. *Uqāb*—Eagle

Studien, p. 127; Amīn Ma'lūf, *Mu'jam al-Ḥayawān*, Beirut: Dār al-Rā'id al-'Arabī, 3rd ed. 1985; 'Abd Allāh al-Nujūmī and Others, *al-Tuyūr al-Maṣrīyah*, Cairo, 1950.

¹⁸⁵ See Möller, *Studien*, pp. 127-131. Möller's research on Islamic falconry literature was based mainly on al-Ghiṭrīf, whom he saw as the major source of all the Arabic falconry literature. See Möller and Viré, *Al-Ghiṭrīf ibn Qudāma al-Ġassānī*, pp. 11-14, 25-39. See also Kushājīm, *al-Maṣāyid wa-al-maṭārid*, p. 48 (in listing the four groups, Ṭalas's edition has ravens instead of eagles). There is a great deal of confusion regarding the definition of these types of birds, as reflected in the Arabic sources. See, for example, "al-Ṣuqūr wa-al-Qanṣ, al-Tā'ir wa-al-Riyaḍah wa-al-Tā'rikh—Mawḍū' Khāṣṣ," *Majalat al-Fayṣal*, ed. 'Alawī Ṭāhā al-Ṣāfi, al-Riyadh, I (1389/1978), pp. 91-113, quoting from Kushājīm in explaining the types of *ṣuqūr*: "... العرب كانوا يسمون كل طائر جارح صقراً. . . . الشاهين والزرق والبوؤ والباشق كلها صقور. . . . ما خلا النسر والعقاب — the *shāhīn* (Peregrine), *zurraq* (male Goshawk), *yu'yu'* (Merlin) and the *bāshiq* (female Sparrowhawk) are all part of the *suqūr* The Arabs used to call all raptors *saqr* ... except for the *nīsr* (Vulture) and the '*uqāb* (Eagle)." Al-Qalqashandī, in explaining the names and types of raptors, states that in his time *saqr* was the name of a specific type of bird (most probably the Saker). See al-Qalqashandī, *Ṣubḥ al-a'shā*, vol. II, p. 60. In *Kitāb al-Bayzarah*, the writer notes that there are nine different types of raptors (*jawāriḥ*), Ibn al-Ḥusayn al-Bāzyār, *Kitāb al-Bayzarah*, pp. 49, 65, 95, 104, 108, 110. Kushājīm names 13 types of raptors and al-Qalqashandī counts 15. The size and weight of the falcons also varies. See Kushājīm, *al-Maṣā'id wa-al-maṭārid*, pp. 48-56, 73-103; al-Qalqashandī, *Ṣubḥ al-a'shā*, vol. II, pp. 52-63. See also Ibn Mankalī, *Uns al-malā*, pp. 162-181; al-Baladī, *al-Kāfi fi al-bayzarah*, pp. 53-63.

¹⁸⁶ The modern equivalents are based on Möller's German terminology (Habicht, Wanderfalken, Sakerfalken, Adler).

The basic types were defined according to this classification, which was based on bodily structure, hunting practises, and the appropriate type of training. All the smaller birds that were also used or trained for hunting were classified under these groups. In this way, the Muslims distinguished between the various types of falcons, the peregrines of all kinds and the sakers of all kinds. Each group was divided into levels according to the size and hunting skills of the birds in the group. The females and males of a particular species occupied separate places, and the males in each type were at a lower level because they were smaller than the females and their hunting skills were inferior, and sometimes they were not mentioned at all. This classification did not lead to a uniform system of categorization because there were always doubts regarding the ascription of smaller birds to one group or another.¹⁸⁷

In the Mamluk hunting literature we also find attempts to create hierarchical lists of predatory birds according to their hunting skills. Sometimes the list includes not only birds that were trained for hunting but also those that could not be tamed. Al-Baladī, for example, presents a list of 22 types of predatory birds (including also those that were not tamed for hunting), in which he points out their physical differences, including the wingspan, the size of the head, the size and shape of the tail, the colour of the feathers, colour of the eyes, manner of flying, and even the manner of defecating.¹⁸⁸ Without going into the details of all al-Baladī's descriptions of the differences between these 22 types, we may mention some of them. He writes, for example, that the eagle is a large bird with long legs, broad talons, yellow feet, and a short tail, and in its natural habitat it has various colours, such as black, yellow and red. The *zummaq*, like the eagle, tends to be red, with reddish black eyes. The *sunqur* is a large bird, one and a half times the size of the Saker, with black eyes. It releases its faeces straight down, and in this it resembles the Saker and the Peregrine.

It is interesting to read the distinction made by the falconry authors between manners of defecation, which is also a method of zoological identification today. Regarding the hawk, al-Baladī describes its yellow eyes, long body, long legs, and long tail. He writes that it sprays its excrement far from the *kundarah*, the place where it sits on a wooden pole. The Saker has black eyes, short blue legs, and is smaller than the goshawk. On

¹⁸⁷ Al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, p. 16; Kushājīm, *al-Maṣāyid wa-al-Maṭārid*, p. 48; al-Baladī, *al-Kāfi fī al-bayzarah*, pp. 57-63; Ibn Mankalī, *Uns al-malā*, pp. 180-181; Ibn Qushtumur, *al-Qānūn al-wāḍiḥ*, K.K., Ms. 978, fols. 14v^o -17r^o.

¹⁸⁸ Al-Baladī, *al-Kāfi fī al-bayzarah*, pp. 57-63.

the difference between the Saker and the Peregrine, he writes that the Saker's tail is a little longer than the length of its wings, while the Peregrine's tail is exactly the same length as its wings, and that is an important identifying mark. The saker's legs are blue and those of the peregrine are yellow or green. Another identifying mark is the black colour of the saker's face. Another difference, this time between the hawk and the bird known as the *subar*, is also related to the colour of the eyes. The hawk has yellow eyes, while the *subar* has black eyes.¹⁸⁹

Within each species the writers differentiate between birds according to their dominant colours and classify them by their hunting skills. Al-Asadī presents considerable geographical information on the dispersion of birds according to their colours.¹⁹⁰ A similar classification appears in Ibn Qushtumur's falconry book.¹⁹¹ Al-Baladī deals with the four primary colours which he sees as the basis of the infinite range of colours existing among predatory birds: white, black, red and yellow.¹⁹² In discussing the colours, which also indicate the nature of the bird and its hunting skills, he uses medical theory to explain the superiority of yellow birds among all types of falcons and hawks. According to this explanation, its talent for hunting is the direct result of the yellow bile that dominates in the bird's body and also affects the colour of its feathers, although the yellow bird has a hot temperament and is hard to handle.¹⁹³ This explanation contradicts other opinions quoted by the writer to the effect that every species has the colour most suited to it.¹⁹⁴

The various names of hunting birds that are mentioned in falconry sources reflect an effort to provide comprehensive zoological information obtained from experts on predatory birds. As mentioned, it is not always easy to identify these birds according to modern professional criteria.¹⁹⁵

¹⁸⁹ *Ibid.*

¹⁹⁰ Al-Asadī, *al-Jamharah fi al-bayzarah*, Escorial Library, Madrid, Ms. ESC. 903.

¹⁹¹ Ibn Qushtumur, *al-Qānūn al-wāḍih*, K.K., Ms. 978, fols. 22v^o – 213r^o.

¹⁹² Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 66.

¹⁹³ *Ibid.*, p. 93.

¹⁹⁴ For example, the *shāhīn* (Peregrine), which is red, is considered good by the Persians and Byzantines. Blue mixed with black is also considered good. Greyish-white, *ashhab*, is perhaps the most beautiful and responds quickly to training, but is weak in hunting. The best according to all opinions is the pure white hawk that originates from Armenia, a cold and snowy country. This hawk is described as very brave and beautiful, quickly trained, but with a delicate personality and unable to hunt large birds. Regarding other species such as the saker or the Peregrine, the writer states that their original colour is black. The best eagle is the red one with yellow legs. See *Ibid.*, pp. 85–95.

¹⁹⁵ *Ibid.*, pp. 69–74, 112. Möller classified all the names according to the different groups, but he emphasized that it is still necessary to study the sources, especially al-Asadī's book,

Following is a list of those that are said to be used for hawking and falconry:

1. *Sunqur* (pl. *sanāqir*) or *ṣunqur* or *tughrīl*: these are types of northern falcons, presumably gyrfalcons, that were not well known to the writers.¹⁹⁶
2. *Bāz* (pl. *buzāt*) is, most probably, the Arabic name of the female goshawk. Ibn Mankalī counts seven kinds of hawks, classifying them according to their countries of origin. For example, the hawks from the Kurj region are called *kurjīyah* and are pure white (*ashhab*). These birds are very rare and are found only in Kurj (Georgia). Ibn Mankalī writes that these are the most beautiful, strongest and largest of all the hawks and also the most long-lived, and therefore they are designated only for sultans and kings, who can afford to pay high prices for them.¹⁹⁷
3. *Zurraq*—the male Goshawk. This name was used mainly in Iraq and the Hijaz (Arabian Peninsula). In Egypt and Syria it was called *sāf*.
4. *Shāhīn* (pl. *shawāhīn*) or Peregrine. The Mamluk hunting treatises mention five subspecies of the *shāhīn*, differentiated by their colours. Ibn Mankalī remarks that the white ones are the best and noblest. Ibn Mankalī divides the Peregrine s into subgroups, the first of which is called *shāhīn baḥrī* and the second *shāhīn kūhī*, which is identical with the ‘mountain falcon’—*shāhīn jabalī*.¹⁹⁸ These subgroups are also differentiated by colour and hunting skills. The colours include black, red, green, yellow and white, and in the case of the *shāhīn kūhī* the black are considered the best. The latter’s physical description includes short legs, a full chest, and broad shoulders. There is also a distinction between the young and the mature bird. The nestling has broad stripes on its chest, and after moulting the new black feathers are a deeper black and the white is whiter, the neck is shorter, the eyes sunken, and the tail is shorter, with less feathers. The feet are ‘green’, with long talons, and the eyes and nostrils are wide. Ibn Mankalī also mentions species belonging to different regions such as al-Rūm (Byzantine), Ṭūqān,

al-Jamharah fi al-bayzarah, together with an ornithologist in order to arrive at a more accurate identification of species and sub-species.

¹⁹⁶ Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 69; Ibn Mankalī, *Uns al-malā*, p. 172.

¹⁹⁷ Ibn Mankalī, *Uns al-malā*, p. 163; Al-Baladī, *al-Kāfi fi al-bayzarah*, pp. 69–71.

¹⁹⁸ Ibn Mankalī, *Uns al-malā*, pp. 170–171.

Qūnya, Sīwās, Malta, Diyār-Bakr, saying that most of them use similar hunting methods and pointing out the superiority of falcons from Persia over those of Byzantium.¹⁹⁹

5. *Anīqī*—the male Peregrine, known in Iraq as *kurraq* or *ʿawsaq*.
6. *Ṣaqr* (pl. *ṣuqūr*) or *ḥurr* is presumably the female Saker. Ibn Mankalī writes that these pass over the area of Iraq twice yearly in their migrating seasons. The Saker s are given different names according to their seasons. Those that pass over the region in August/September are called *al-ṭālīʿ*, because they emerge from the sea, while those who migrate in other months, or nest in the same place, are called *al-mubtadir*.²⁰⁰ We also find distinctions between these birds according to colour—black, yellow, red, green, *ashqar*—reddish-yellow, and *al-miskī*, and black is considered the best.²⁰¹
7. *Kūbaj* (pl. *kawābij*) is the male Saker. Al-Baladī explains that this bird is called *saqāwah* (pl. *saqāwāt*) in Syria and Hijāz,²⁰² and in Iraq it is called *sharq* (pl. *shurūq*).²⁰³ Möller claims that it can be identified with the lanner according to two signs: a) it is stated explicitly that its origin is in North Africa, and b) writers often confuse it with the male Saker, which it resembles.²⁰⁴
8. The falconry writers count eagles among the predatory birds that can be trained for hunting. The general name of this species is *ʿuqāb* (pl. *ʿuqbān*), referring to both males and females. Ibn Mankalī writes that eagles' names vary from country to country, and this is relevant to the use of different names for the same species. *Al-ʿuqāb al-ṣaydī* is the fifth in al-Baladī's list.²⁰⁵ He argues that this is the only type of eagle that is capable of being trained for hunting. Its breeding and nesting grounds are in the high mountains of Zawazān and the land of the Kurds, but in the Maghreb countries there are also kinds of eagles that are considered excellent, together with a species called *al-khudāriyāt*.²⁰⁶

¹⁹⁹ *Ibid.*, pp. 170–171.

²⁰⁰ *Ibid.*, p. 173.

²⁰¹ *Ibid.*, p. 174.

²⁰² Al-Baladī, *al-Kāfi fī al-bayzarah*, p. 112.

²⁰³ *Ibid.*, p. 73.

²⁰⁴ Möller, *Studien*, p. 130.

²⁰⁵ Al-Baladī, *al-Kāfi fī al-bayzarah*, p. 73.

²⁰⁶ Zawazān is between the hills of Armenia and Azerbaijan and Diyār Bakr. The residents of this country are mostly Kurds who belong to groups of al-Bashawīyah and al-Bakhtiyah. See Yāqūt al-Ḥamawī, *Kitāb al-Buldān*, vol. II, p. 957.

9. *Zummaj* (pl. *zamāmij*) is the name of a male eagle.²⁰⁷
10. *Bāshiq* (pl. *bawāshiq*)—in some sources also *bawāshiq*. In Egypt and Syria this bird is called *sāf*. It has been identified with the female Sparrowhawk.²⁰⁸ Among the varieties of *bāshiq* there is *nayfaq*, which is spotted yellow (*arqaṭ*), and is considered the strongest and best, with excellent skills for hunting large birds.²⁰⁹ Al-Baladī refers to a variety from the land of the Kurds as the best.²¹⁰
11. *Al-sanak*—this bird is hardly mentioned in the sources except for the fact of its rarity, and the remark that it exists only in the region south of Persia and cannot survive in cold countries.²¹¹
12. *Tuhruqah*, *tahrikah*, or *tahrijah* (pl. *tahārik*) in Iraq, and *quṭāmī* in Syria. This bird is said to belong to the *baḥri* peregrine variety.²¹² It may be that this is the Eleonora's falcon. Another name that is (rarely) identified with the *quṭāmī* is 'awsaq. Al-Baladī states that *al-tuhruqah* exist everywhere but are not numerous.²¹³
13. *Yu'yu'* (pl. *yawāyi'*), known in Egypt and Syria as *jalam*, has been identified with the merlin.²¹⁴ It is generally considered as a sort of saker, and infrequently as a sort of peregrine.
14. 'Aḫṣī in Iraq and Hijāz, and *baydaq* in Egypt and Syria—has been identified as the male Sparrowhawk.²¹⁵

A demonstration of the confusion characteristic of this terminology can be found in al-Baladī's treatise. After listing the names of the male hunting birds, and even mentioning their various names used in different countries, he asserts that each of these names represents a different "species" (*jins*), which includes both males and females. His basic argument is that it is possible for different "species" (*ajnās*) to mate.²¹⁶

²⁰⁷ Al-Baladī, *al-Kāfi fi al-bayzarah*, pp. 73, 112. According to Möller, this term was also used to denote females. See Möller, *Studien*, p. 130.

²⁰⁸ *Ibid.*, p. 129.

²⁰⁹ Ibn Mankalī, *Uns al-malā*, pp. 166-167.

²¹⁰ Al-Baladī, *al-Kāfi fi al-bayzarah*, pp. 73, 112.

²¹¹ *Ibid.*, pp. 73-74.

²¹² Al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, p. 18; Ibn Qushtumur, *al-Qānūn al-wāḍiḥ*, K.K., Ms. 978, fols. 15r°.

²¹³ Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 74.

²¹⁴ Möller, *Studien*, p. 130.

²¹⁵ Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 112; Möller, *Studien*, p. 129. Al-Baladī notes that the last three varieties are widely dispersed throughout the world. See al-Baladī, *al-Kāfi fi al-bayzarah*, p. 74.

²¹⁶ Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 112.

CHAPTER SIX

PREVENTIVE MEDICINE AND DIAGNOSTICS

A. HEALTH MANAGEMENT—PREVENTIVE MEDICINE AND DIETETICS

The preservation of animals' health was (and still is) a central aspect of veterinary medicine, and much of the material in veterinary treatises of the Mamluk period deals with the maintenance of animals in good health from birth to old age. Presumably this was connected with the veterinarian's role as consultant to the animals' owners, and the information provided in the treatises guided those who worked with animals, whether as professional veterinarians or as keepers. A vital part of this guidance was the recommendation of kinds of food to be given to animals according to their general state of health. In this context, dietary supplements played an important part, particularly those obtained from plants, minerals of various kinds, and animals' organs. Mostly, we read that the veterinarian's declared purpose in choosing food was the need to preserve a balance between the four humours in the animal's body, in keeping with the principles of the medical theory in this regard. In deciding on the types of food, the veterinarians took into consideration such factors as the climate, the weather, the geographical location, the animal's general health, and its physical condition prior to a hunt or a military campaign. They also had to pay attention to specific conditions of the body that might affect the animal's general health, such as oestrus ('heat'), pregnancy, giving birth, moulting and suckling.

Nearly every veterinary book contains long chapters on different kinds of food and their suitability for specific animals in order to maintain their health.¹ To a certain extent, this was seen as preventive treatment to avert illnesses caused by changes in the weather, intense physical exertion during journeys, or injuries on the way caused by sandstorms or dust storms, which were often the fate of camels, horses, and other pack animals.² In discussing the health of hunting animals, the authors related to the dietary

¹ See, for example, al-Malik al-Ashraf, *al-Mughnī*, p. 157.

² Al-Malik al-Ashraf, describing the treatment of camels arriving from a long and hard journey, discusses the types of food that should be given to them and the way to treat injuries sustained during the journey. See *Ibid.*, p. 202.

regime appropriate for birds, dogs, and cheetahs. In this case, the main purpose was to maintain their physical fitness in order to ensure a successful hunt, which required careful preparations, including the provision of calculated quantities of kinds of meat suitable for feeding the different animals that took part in the hunt.³

Al-Malik al-Ashraf's veterinary treatise on the care of horses and pack animals includes a chapter entitled "Things useful for preserving the health of beasts of burden [*dawāb*] at all times and protecting them from the various damages of the weather."⁴ This chapter features a prescription composed of several substances that are believed to have a beneficial effect on the health, and the author advises everyone who cares about the health of the animals he treats to make a point of using it regularly at the beginning of every season. The mixture prescribed is a kind of treacle (*tiryāq*—theriaca), similar to that recommended by general doctors as a prophylactic against every disease that might attack humans.⁵ The veterinary prescription mainly consists of substances to smell (obtained from fragrant herbs), such as camphor, musk, roses and saffron. The author explains how to prepare the mixture, by crushing the fragrant substances, mixing them and heating them in rose water. The resulting mixture has to be kept in a glass or earthenware vessel, designed for long term storage. He emphasizes that it is the duty of every animal owner, or anyone responsible for an animal's care, to keep a sufficient quantity of this medication available for immediate use in the stable. He states that regular use of this mixture helps the

³ See, for example, "في حفظ قوانين صحة الجوارح من الأهوية والحر والبرد وحفظ صحتها بالمعاجين"—Rules for the care of hunting birds, their protection from wind, heat and cold, as well as, for keeping them healthy by using ointments," Ibn Qushtumur, *al-Qānūn al-wāḍiḥ*, K.K. Ms. 978, fol. 53v°.

⁴ — في ذكر ما يستعمل لصحة الدواب في سائر الأوقات ومخفظها من الأهوية — Methods for keeping animals healthy and their protection from winds," al-Malik al-Ashraf, *al-Mughnī*, p. 157.

⁵ An important pharmacological book from the beginning of the Mamluk period, by Abū al-Muná Dāwūd b. Abī al-Naṣr known as al-ʿAṭṭār al-Hārūnī (d. 658/1259), gives a detailed description of the virtues of theriaca—*tiryāq*, called in the book *al-Diryāq al-akbar* and also *al-Fārūq*. The writer offers several different prescriptions for the preparation of *tiryāq* and discusses the different uses of it. *Tiryāq*'s main use is for treating snake bites and eliminating poisons from the body. He also mentions another kind of *tiryāq*, claiming that it is effective for treating problems of the bowels, pains in the liver and spleen, severe chronic headaches, and rapid heartbeat, as well as poisoning by animals, reptiles or mosquitoes. See Abū al-Muná Dāwūd b. Abī al-Naṣr known as al-ʿAṭṭār al-Hārūnī [or Cohen al-ʿAṭṭār] (d. 658/1259), *Minhāj al-dukkān wa-dustūr al-aʿyān fī aʿmāl wa-tarākīb al-adwiyah al-nāfiʿah li-al-abdān*, ed. Ḥasan ʿAṣī, Bierut: Dār al-Manāhil, 1992, pp. 127-134.

animal to cope with seasonal changes in the weather and is also good for the respiratory system.⁶

Most of the writers stress the importance of maintaining strict hygienic conditions for the animal and its surroundings. The instructions emphasize individual attention to animals and include the necessity of sweeping up the accumulated excreta every day, ensuring cleanliness of the vessels used for drinking water or food and clean drinking water for the night, and spraying water underneath the animal in order to keep the place moist and prevent bad odours from the body.⁷

1. *Horses*

Abū Bakr distinguishes between two types of fattening food, one for simple thinness and the other for thinness caused by disease. In the first case, he cites the example of feeding thin horses with pulses such as beans, chick-pea soaked in water, cracked wheat, and so forth, while for thinness caused by disease he recommends herbs such as *najīl* (a variety of orchard grass), sugar cane, a kind of leaf similar to vine leaves, sycamore leaves, and even water melon.⁸

The ratio of water to food depends on the kind of food. If it is fresh green grass, which is full of moisture, the writers advocate reducing the amount of drinking water, but if it is dry straw the amount of water has to be increased. The season of the year also influences the amount of food and water to be given to animals; in winter or cold weather the writers recommend watering them only once in 24 hours (instead of twice), but in the hot summer the animals should be fed with dry straw only after their morning drink at sunrise, which is the best time for drinking and at noon or in the early afternoon. These two times, say the veterinary writers, are the most suitable for the health of the animals, and they warn of a situation in which the animal is prevented from drinking water at its accustomed time, which could be dangerous and cause severe debilitation, *humrah*.

⁶ Al-Malik al-Ashraf, *al-Mughnī*, p. 157.

⁷ Ibn Mankalī, for example, ascribes great importance to the cleanliness of the vessels used for the animals' drinking water, and he sharply criticizes those Mamluk soldiers who do not take care of their horses and leave this task to servant boys, who not only cheat their masters by stealing part of the food intended for the horses but also wash their greasy hands in the same dishes in which the horses' drinking water is served, thus endangering the horses' health. See Ibn Mankalī, *Uns al-malā*, p. 45.

⁸ See Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 193. Al-Malik al-Ashraf also lists several kinds of food that are effective for fattening thin horses who are not sick. See al-Malik al-Ashraf, *al-Mughnī*, p. 142.

A mare that is pregnant requires special consideration. One of the rules quoted in the veterinary literature is that fodder has to be available for pregnant mares at all hours of the day, while those who are not pregnant are fed twice daily, early in the morning and in the evening.⁹

Generally the writers suggest hanging a fodder bag around the horse's neck with the amount of food required for each horse. This method is called *'ta'liq al-ra's'*, from the word meaning "to hang."¹⁰ Another method described in the sources was placing the straw in a pile on the ground. According to this method, it was not necessary to be too strict about the quantity of straw, the assumption being that the horse would stop eating when it felt full. The veterinary sources suggest feeding horses by the *ta'liq* method at midday before the call to prayer, and before watering them.¹¹ It is not surprising to discover that the times for feeding and watering horses were set according to the Muslim prayer times, reflecting what might be called an "Islamic" treatment routine, matching the life schedule in Muslim society.

The treatment of horses in preparation for races or sports (mainly polo) was important in Mamluk society. This regime of preparation, aimed at making the horse lose weight and burn off surplus fat, and at strengthening his muscles, was called *iḍmār* or *taḍmīr*. The three elements of the *iḍmār* enumerated by al-Malik al-Mujāhid are covering the horse with cloth to make him sweat, feeding him solely with dry straw, and walking him frequently. This process, that took place in a special site allocated for this purpose (*miḍmār*), would last no longer than forty days.¹²

In contrast to al-Malik al-Mujāhid, Abū Bakr mentions five different elements related to *iḍmār*, declaring that this knowledge is important for everyone who works with horses.¹³ The five elements are:

A. Knowledge of the individual characteristics of the horse to be prepared for the race. On this matter Abū Bakr refers the reader to all the early chapters of his book, in which he discusses at length the physical and psychological characteristics of the ideal racehorse.

⁹ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, pp. 167-178; al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, pp. 202-226; al-Dimyāṭī, *Faḍl al-khayl*, p. 74; al-Šāhib Taj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, pp. 146-169; al-Malik al-Ashraf, *al-Mughnī*, pp. 142-144.

¹⁰ The person in charge of watering the court animals, called in the sources *saqqā'*, was also responsible for the *ta'liq* and for cleaning of the old straw—*ḥasik*. In fact, he was responsible for all the everyday tasks needed to maintain the well-being and health of the horses in the stables.

¹¹ Al-Malik al-Ashraf, *al-Mughnī*, p. 142.

¹² Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, pp. 205-206.

¹³ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, pp. 167-178.

B. Knowledge of the most suitable times for starting the horse on the *idmār* regime. According to Abū Bakr, the best time is early spring, before the oppressive summer heat. Autumn is also suitable. He warns against conducting *taḍmīr* in summer or winter, because the extremes of heat and cold might have an adverse effect on the horse's health. The *idmār* usually lasted for one month, but there were some veterinarians who extended the period to forty and even fifty days, which was the maximum time permitted according to the veterinary sources.¹⁴

C. Knowledge of the kinds of food and other forms of special treatment of horses during the *idmār* process. Abū Bakr stresses that *idmār* is not a method of starving the horse or depriving it of water. The purpose of the regime is to prepare the horse for racing by enhancing its physical ability, strengthening its muscles, and burning off excess fat. In other words, this is a process during which the horse is gradually introduced to a regime of activity including a suitable diet to make him more muscular, stronger and more fit to stand the exertion required of him during the races. For this purpose, Abū Bakr suggests gradually adding an extra portion of sifted barley and alfalfa, *qat*, while gradually reducing the amount of straw. He specifies the exact amounts to be given to the horse, consisting of six cupfuls (*aqdāḥ*) of barley, and a measure of ten to fifteen rotls¹⁵ of alfalfa and straw together.

¹⁴ *Ibid.*, p. 169.

¹⁵ It is hard to follow all the terms related to weights and quantities used by Abū Bakr. The word *qadaḥ*, for example, refers to a certain unit of volume, and a rotl—*raṭl*—is a unit of weight that is measured differently in every country, or even in different regions. A cookbook from the 13th century, written by Ibn al-ʿAdīm (d. 1262), contains many recipes, using the rotl generally as a measurement, in addition to the rotl specific to different places, such as a Damascene rotl (p. 387), a Shāmī rotle (p. 455), Iraqi rotl (pp. 444, 455), and Egyptian rotl (pp. 328-494, 505, 542). Ibn al-ʿAdīm also mentions the Zahirī rotl, which was introduced by the Fāṭimid ruler al-Zāhir and used in the markets of Aleppo during the visit of the traveler Naṣir Khasraw in 439 of the Hij./1047 CE (p. 321). See Kamāl al-Dīn Abū al-Qāsim ʿUmar b. Aḥmad Hibat Allāh Ibn al-ʿAdīm (d. 660/1262), *al-Waṣṭah ilā al-ḥabīb fī waṣf al-ṭayyibāt wa- al-ṭīb*, ed. Sulaymā Maḥjūb wa-Durriyah al-Khatīb (Aleppo: Maʿhad al-Turāth al-ʿIlmī al-ʿArabī wa-Manshūrāt Jāmiʿat Ḥalab, 1986-1988), 2 vols; Abū Bakr al-Bayṭār, *Kāshif*, vol. I, pp. 169, 173, etc. In the fourth volume of the scientific edition of Ibn Sīnā's *al-Qānūn fī al-ṭibb*, the editors note in the index of weights the *raṭl* as it appears in various sources. For example, according to al-Khawārizmī it is worth 128 dirham. According to Ibn al-Ukhūwah, a rotl is worth 12 ounces and 12 dirhams. According to *Lisān al-ʿArab*, a rotl is worth 12 ounces and 20 *astār*. See Ibn Sīnā, *al-Qānūn fī al-ṭibb*, vol. IV, p. 19. On weights in the Islamic world, see Eliyahu Ashtor, "Levantine Weights and Standard Parcels: A Contribution to the Metrology of the Later Middle Ages," *Bulletin of the School of Oriental and African Studies*, 45 (1982), pp. 471-488; Walther Hinz, *Islamische Masse und Gewichte: umgerechnet ins metrische System*, Leiden: E.J. Brill, 1995.

D. Knowledge and correct application of the training method, including walking and galloping the horse. In this section Abū Bakr describes the preparation of the place where the horse will be kept during the *idmār*. He emphasizes the importance of maintaining cleanliness by such measures as scattering sand and sprinkling water under the horse's feet, and recommends preparing a soft mat of straw spread over clean sand so as to enable the horse to stretch out on the ground. The main emphasis is on the physical training of the horse throughout the entire period, walking and galloping the horse for measured distances of five hundred cubits, in order to make it sweat and thus enhance its physical fitness.¹⁶ The author also explains the manner of galloping the horse and the method to be used for encouraging him while cantering.

E. Knowledge of the many laws related to horse races, for example, the distance to be covered, the maximum permitted weight of the rider, the overall weight of the tack on the horse, and so forth. These rules, says Abū Bakr, are important for preparing the horse for a race that matches its physical and mental abilities.¹⁷

In the context of types of food, the authors sometimes refer to the animals' original habitat, but only generally, without mentioning specific names of countries, and the main consideration is the climate and temperatures of those countries. On the basis of this consideration, they state that the best food for horses and mules in cold countries is fodder rich in cereals such as straw, *khalt* and *qaḍb*, adding that these three components should be mixed in equal quantities.¹⁸ They assert that changing the proportions of two of the components might affect the physical characteristics of the horse.

Sometimes the writers refer to different methods of feeding in different areas and countries in the Mamluk sultanate. For example, in al-Shām (Greater Syria), the custom was to allow the horses to graze freely in the pasture. According to the sources, this method was most satisfying for the

¹⁶ The veterinary writers describe several methods of causing the horse to perspire and burn off surplus fat, making the body tauter and more muscular. One popular method was to drape heavy cloths on the horse and tie the saddle tightly to its body. See, for example, al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 206.

¹⁷ Abū Bakr al-Baytār, *Kāshif*, vol. I, pp. 167-178.

¹⁸ Al-Malik al-Ashraf names plants that are good for horse fodder. He mentions mainly herbs or plants that grow in the area of Yemen and the south of the Arabian Peninsula, for example, the herb *qaḍb*, a perennial plant also known as *faṣṣah* or *faṣṣah raṭbah*, that is suitable for animal grazing. See *Muḥjam al-muṣṭalahāt*, p. 539; *al-Mawsū'ah fi 'ulūm al-ṭabī'ah*, vol. II, p. 243; al-Malik al-Ashraf, *al-Mughnī*, p. 142.

horses, especially when the forage was based on a plant called *aybad*. Another plant, *bughāl*, was regarded as particularly healthy, and both of these were common in Syria.¹⁹ Abū Bakr discusses the question of letting horses forage freely in the pasture, especially in springtime, and uses a special term for this—*tarbīʿ*. He distinguishes between kinds of forage in different countries and their effect on the horses' health. In Egypt, for example, he says that the fodder available in the pasture is clover (*barsīm*) which is effective in cleaning the stomach of poisons and waste food. In springtime in the Ṣaʿīd region (Upper Egypt) the horses can eat from the astragalus plant, called *kutayḥ*, which he describes as a plant with yellow blossom like alfalfa (*faṣṣah*). In Syria, during the spring the horses eat plants such as alfalfa, green hay (*qasīl*), and vetch (*al-bīqīyah*), a plant of the vicia genus. Abū Bakr adds that Syrian horses are better able to feed on straw and barley than Egyptian horses, because the barley that grows in Syria is easier to digest than the barley in Egypt. In the coastal regions, Abū Bakr mentions the small green vetch (*kirsannah*) as a food source that grows in spring and is healthy for horses. The same author writes that in Hijaz and Yemen it was customary to feed horses with sweet corn, the *daksah* plant, and even dates and leaves from trees.²⁰

2. Camels

The ongoing care of camels also required considerable skill, because these animals carried heavy loads on their backs over long distances. Keeping the camel in good health and preparing it for a long journey was the aim of every veterinarian who was responsible for such a journey, especially in the case of pilgrimage, the Hajj to the holy cities in the Hejaz that was organized by the Mamluk rulers. The veterinary authors describe the types of food necessary, specifying the quantities of food and water and the feeding times. Some writers attempt to explain botanically the kinds of plants that are good fodder for camels. Among these we find *al-qadb*, mentioned above, and *al-salām*, which the authors describe as a yellow flower similar to camomile, but with a different smell.²¹ The list of plants that are good for camels includes some that might be harmful if eaten in large quantities. For example, there is a description of a weed called *ruʿf*, that might cause severe skin diseases—*jarab* (scabies?) in a camel that

¹⁹ Al-Malik al-Ashraf, *al-Mughnī*, p. 143.

²⁰ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 191.

²¹ Al-Malik al-Ashraf, *al-Mughnī*, p. 207.

eats a large amount.²² The kinds of fodder recommended are classified according to the types of camel. For example, the writers distinguish between fodder that is suitable for *Tuhāmah* camels from the Arabian Peninsula and camels from the hills of Yemen.²³

Apart from food, the veterinary sources also include advice relevant specifically to camels; for instance, when to remove the cloth covering the camel's back at the end of a long journey, the length of time the camel needs to rest, and the routine care of the camel, such as rubbing its coat with special substances.²⁴

A subject of special interest is the veterinarians' recommendation of inhalants (*su'ūt*) to be administered to camels six times a year, once every two months, in order to keep them in good health. For a weak camel weak they recommended increasing the frequency to once a month.²⁵ Another treatment recommended especially for camels is shearing once every two to three months. Skin diseases and hair loss are common problems with camels; therefore, say the writers, it is vitally important to rub the camel's body with special oils in order to soften the skin that has become hardened and dry from the heavy loads on its back.²⁶ Some of the veterinary writers also recommend paying special attention to the hygiene of the camel, keeping its surroundings clean and dampening its lair and sprinkling water to cool it, in addition to the explicit instruction to stroke the camel constantly. These writers explain that stroking is very beneficial for the health of the camel and gives it great satisfaction, which in turn also helps to prepare it optimally for the next long journey.²⁷

3. *Hunting Birds*

The hawker/falconers' arduous work did not begin and end with the hunt; they were constantly busy in the courtyard and mews, the area allotted to the hawks and falcons. The writers of *bayzarah* treatises set down strict rules concerning the mew's cleanliness, airing, lighting or darkening, all according to the circumstances, for instance, before the hunt or after it, in the moulting season or after it.²⁸

²² *Ibid.*, p. 207.

²³ *Ibid.*, p. 208.

²⁴ *Ibid.*, p. 202.

²⁵ *Ibid.*

²⁶ *Ibid.*, p. 204; See also figure 19, showing the treatment of hair loss in camels.

²⁷ *Ibid.*, p. 204; al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, pp. 395-396.

²⁸ Al-Ghiṭrif, *Kitāb Ḍawārī al-ṭayr*, p. 63; al-Baladī, *al-Kāfi fī al-bayzarah*, pp. 344-347.

But above all, treatises dedicated to the care of hunting birds lay great stress on the preservation of the hunting birds' health through proper feeding, stating that most illnesses of birds are caused by food. The principle of correct feeding in measured quantities at the right times became an iron rule in the care and treatment of hunting birds, and was seen as a guarantee of the bird's health and the balance of its humours, thus strengthening it and increasing its energy, enhancing its motor abilities and natural willingness to hunt. For every bird there is a specific kind of food that is most suitable, largely dependent on the size of the bird and the extent of its activity. The bird's age is also taken into consideration, as well as its current stage of life.²⁹ For example, during the early stages of the bird's life, the hawkers/falconers had to know what kind of food to serve as substitutes for the feeding by its parents. This required also special gentle techniques for feeding them.³⁰ Al-Baladī remarks that a young bird's digestive process is very quick and its body heat is also higher because in its natural environment the chick receives food from its mother every hour in order to promote its growth and its ability to fly.³¹ In contrast, a goshawk (*bāzī*) that has already been through a moulting season in the wild can eat all its food at once because it has begun to fly by itself and consequently can digest food quickly, since the activity of flying helps to speed up the bird's digestion and also increases its appetite. These methods employed in helping to modify the bird's behaviour to suit its new life conditions in captivity reflect an awareness of the need to take into consideration environmental changes to which the birds were subjected.³²

The veterinary writers insist on is the duty to perform a daily physical examination of the bird. The hawk/falconer was required to be familiar with the bird's eating habits, the amount of food it usually eats, and the times of its excretion, which are related to the individual pace of each bird's digestive process. The *bayzarah* treatises distinguish between two kinds of excretion: one, *dharq*, described as similar to human excretion of faeces from the anus, and the other, regurgitation of undigested food remnants, or *raymaj*. This subject is discussed extensively in the hawking and

²⁹ Concerning the precise quantities of food for each bird, according to its size and physical condition, see, for example, al-Baladī, *al-Kāfi fi al-bayzarah*, p. 178; Ibn Qushtumur, *al-Qānūn al-wāḍiḥ*, K.K., Ms. 978, fols. 55v^o -67r^o.

³⁰ Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 124-125; K.K., Ms. 978, fol. 61r^o.

³¹ Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 183.

³² "و رأيت منها ما لا يأكل حتى مات من عزة نفسه" al-Baladī, *al-Kāfi fi al-bayzarah*, p. 130; see also, p. 183; al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, pp. 43-46.

falconry literature, which provides instructions for helping the bird in the excretion process, including specific directions adapted to every type of hunting bird, in the different phases of its life.³³

The working daily of hawkers and falconers was divided into 24 hours in order to set regular feeding times. A goshawk (*bāzī*) had to be fed twice in 24 hours, once in the early morning and once at the end of the day,³⁴ in two equal portions. In summertime, when the days grew longer, the amount of food given at night was reduced whereas the morning portion was increased, and vice versa in winter. This arrangement was described as most suitable for young untamed birds. Another suggested pattern instructs the hawker/falconer to give the bird most of its food all together in the morning, and in the evening to give it just three small bites of fresh meat to calm it and “make it feel good.”³⁵ If the bird could not cope with this arrangement, it could be fed three times, morning, noon and evening, according to its natural ability to digest the food. In case it preferred to eat twice a day, the time of the evening meal had to be carefully calculated.³⁶

The hawker/falconer was required to be aware of the bird's natural digestive cycle and the time it takes to feel full. One author writes that it takes a goshawk three hours to digest the food and then excrete it. Following this process, it is claimed that the bird continues to feel full for six more hours. Afterwards, it is important to leave the bird in a state of hunger for the next three hours until morning, so that it would have appetite for its morning meal. By this time, says the same writer, the bird would be clean of remnants of food from the night meal, whether digested or not. A young hawk, if it is quite large, should be fed at sunrise in winter, and every two hours in the long days of summer, since the young hawk's stamina deteriorates when it is hungry.³⁷

There were also certain rules of behaviour that were incumbent upon every handler of hunting birds. For example, the hawker/falconer had to carry the bird on his hand twice a day, morning and evening. This was an

³³ See, for example, al-Baladī, *al-Kāfi fi al-bayzarah*, pp. 178, 181-198, 203, 217-221, 230.

³⁴ On the division into 24 hours and the time frame described in al-Baladī's treatise concerning birds' feeding times, it should be noted that this was an innovation in hawking and falconry treatises, perhaps in the context of the innovations that appeared in these treatises in the late Ayyubid and early Mamluk periods. Al-Baladī, a hawker/falconer of the late 6th, early 7th century of the Hij. (13th century CE), was one of the few writers to refer to the precise division of the day into a 24-hour schedule. Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 182.

³⁵ *Ibid.*

³⁶ *Ibid.*, pp. 182-183.

³⁷ *Ibid.*, p. 183.

important part of the special treatment of a bird that was subjected to the above-mentioned dietary regime. Apart from the morning and evening outings with the bird on his hand, the falconer or hawkler also had to take it on a nightly outing, in order to arouse its desire to rid itself of food remnants that had accumulated in the body and spit them out, an action called in Arabic *raymaj* or *ramj*.³⁸ This regime was suitable for most types of hunting birds, except for the eagle, which was trained for hunting in a different way, more drastically than the other birds, and even somewhat violently. The eagle was given no food whatsoever for three days, and the veterinary sources even refer to certain types of eagles that could be deprived of food for ten consecutive days.³⁹

One of the most difficult periods in the care of Sparrowhawks (*bāshiq*) is the moulting season; at this time the hawkler/falconer has to pay special attention to the food served to the bird. Some hawking and falconry treatises dedicate entire chapters to this subject, discussing the kinds of food and its quantities, as well as the ongoing care of the hawk or falcon during the moulting season.⁴⁰ According to these sources, the quality of the hawkler/falconer's treatment during this period determines whether the bird will be strong and healthy enough to take part in hunts in the future. Therefore, the hawkler/falconer has to concentrate entirely on one aim—for the bird to change its feathers completely and emerge from the process healthier and fitter for hunting than it was before moulting. Most of the writers emphasize that they themselves used to take care of hawks/falcons according to these instructions.⁴¹

Sometimes, especially after the moulting period, it was necessary to help the hunting birds to lose weight, and the slimming regime was also part of the rules of feeding. According to the veterinary sources, the idea behind this slimming regime, called *idmār*—(the same term employed for the slimming regime of horses), was to enhance the bird's hunting ability and arouse its urge to hunt animals and game birds.⁴² This regime was maintained for a period ranging from three to nine days, during which the bird's food was reduced to half of the usual amount, following strict rules for

³⁸ *Ibid.*, p. 179.

³⁹ *Ibid.*

⁴⁰ Al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, pp. 62-68; Kushājīm, *Kitāb al-Maṣā'id wa-al-maṭārid*, p. 114; al-Ḥasan b. al-Ḥusayn, *al-Bayzarah*, pp. 59-61.

⁴¹ See, for instance, al-Ḥasan b. al-Ḥusayn, *al-Bayzarah*, pp. 59-61; al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, pp. 62-68; al-Baladī, *Al-Kāfi fī al-bayzarah*, pp. 347-359.

⁴² "في إضمار الطير بعد خروجه من القرصة" see al-Baladī, *al-Kāfi fī al-bayzarah*, pp. 370-373; al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, p. 69.

gradual reduction so as not to harm the bird in any way. During the first three days the food supply was cut by a quarter, another quarter was cut during the following few days, until finally the bird received only one quarter of its usual consumption.⁴³

Birds that were taken on a hunt for the first time needed extra attention, and the hawker/falconer had to prepare special food to help the young bird to survive the exhausting activity. This was much more difficult in the summer and it was necessary to prepare food containing a mixture of ingredients that were recommended for young Sparrowhawks in hot weather. This mixture was called *barūd*, and the sources describe the precise manner of its preparation, measuring the ingredients by *dirham*'s weight. including one *dirham* of a chalky substance called *tabāshīr*, one *dirham* of watermelon seeds, one *dirham* of cucumber seeds, a *dirham* of pumpkin seeds, a *dirham* of dried roses, a *dirham* of roman clay, and a *dāniq* (a different unit of weight) of camphor. The veterinary sources offer precise instructions for preparing the mixture, which include peeling the various seeds, grinding them together, sifting them through a silk cloth, and finally forming a moist dough of all the ingredients by adding juice squeezed from a citron. The kneaded dough was then divided into small portions, rolled and cut into pieces ready for immediate use when needed. The *barūd* had to be available for the falcons at the start of the hunt in the summer season, and this mixture was known to be effective in preventing dehydration in birds.⁴⁴

Preserving the health of hunting birds was an art that required not only medical and zoological knowledge but also gentle and considerate treatment, because the bird is a very delicate creature that might be harmed by any little thing. The hawking and falconry writers attempted to supply solutions for problems that often arose during long hunting expeditions or when birds were brought from distant places on exhausting sea voyages that sometimes lasted for many weeks or months. Such voyages were not easy for humans, let alone birds. Sea voyages in particular involved complicated logistics for transporting and storing large quantities of meat to be eaten by these birds on board. Ibn Qushtumur, in a still unpublished hawking/falconry treatise (1267), describes the severe damage caused to a certain species of "white hawks" (*al-buzāt al-bīd*)—presumably gyrfalcons—by feeding them with fish during a sea voyage from the region of the Caspian Sea when the stock of live pigeons came to an end. He writes

⁴³ Al-Baladī, *al-Kāfi fi al-bayzarah*, pp. 178-179.

⁴⁴ Al-Ḥasan b. al-Ḥusayn, *al-Bayzarah*, p. 59.

that a menu based on fish has an adverse effect on the health of falcons.⁴⁵ Usāmah Ibn Munqidh writes that his father used to send messengers to look for special types of hawks and falcons and purchase them for him. He describes one case in which his messengers did not estimate accurately the number of pigeons needed to supply food to the hawks they had acquired on their voyage back home from Constantinople. Consequently, they fed them with fish, causing serious health problems and damaging their feathers, which began to get twisted and break.⁴⁶

The management of a correct dietary regime for the bird included the instruction to be alert to signs of distress when the bird, as well as being hungry, was exhausted by chasing quarry during the hunt. Such an extreme situation was considered a real test not only of the bird but also of the hawker/falconer and his treatment. In this situation the hawker/falconer was forbidden to give a hungry and exhausted bird any food immediately because it might be fatal to the bird. These writers describe a condition that might occur both in humans and birds in states of extreme exhaustion accompanied by excitement and gasping for breath, when they are liable to choke as a result of ingesting food through the windpipe instead of the gullet.⁴⁷ In order to prevent asphyxiation, the hawker/falconer is required to give the bird minute quantities of food and that only after it has calmed down. The detailed instructions also stress the importance of giving the bird clear, pure water, for drinking, splashing and bathing. Salty, hot, or stagnant water is to be avoided. In the lack of any direct access to fresh water, the authors suggest preparing a large vessel, filling it with clean water, which had to be changed regularly.⁴⁸

The effect of the seasons and changes in the weather are also described in the treatises as dictating the hunting birds' diet, because these birds are accustomed to eating more in winter than in summer, especially during the two coldest months, December and January. In February (*Shubāt*) they should be fed one third of the amount they were fed in the two preceding months, and when the days become longer they should receive half that amount. These rules for apportioning the quantities of food according to the month of the year are appropriate, say the sources, for the Peregrine,

⁴⁵ البزاة البيض والشهب كثيرًا ما تجلب من بلاد الترك بحر الخزر وقد قيل: فيقل اللحم مع جاليها في البحر " فلا يجدوا سوى لحم السمك فيغذوها منها فيورثها ضعف القوة وضعف النفس *Qānūn al-wādīh*, K.K., Ms. 978, fol. 22v°.

⁴⁶ Usāmah Ibn Munqidh, *Kitāb al-I'tibār*, p. 199.

⁴⁷ See E.g. *Ibid.*, p. 181.

⁴⁸ *Ibid.*

the Saker, *kurk*, *anīqī*, and *kūbaj*, but not for the goshawk (*bāz*) and the Sparrowhawk (*bāshiq*), to which other rules apply. For the wellbeing of these two birds the most important rule is to carry them on the arm for a whole hour every day. This helps to maintain the bird in good health, especially during the period when they are being slimmed down (*iḍmār*).⁴⁹

The authors of *bayzarah* treatises relate to the process of training hunting birds as stages of subduing and softening them, during which the falconers are advised to feed them only two or three hours after daybreak. A *muqarnaṣ* hawk that was not yet tamed had to be fed only four hours after daybreak, as part of the general taming process, in this case to subdue the bird. For the Peregrine (*shāhīn*) different feeding times were recommended, the ideal time being one hour after sunrise, on condition that the bird had already been carried on the handler's arm and taken out before sunrise. This rule is explained as being related to the hunting habits of the Peregrine, a bird used to hunt in the early morning hours after gliding in the sky. Once the sun rises and the other hunting birds are in the sky, especially the eagles and the other large predatory birds, the Peregrine avoids gliding so high due to its natural fear of encountering them. Therefore, the keeper of a Peregrine had to get up early in the morning so as to let his bird fly before the other predatory birds filled the skies.⁵⁰

Great attention is dedicated by the *bayzarah* writers to the preparation of mutton for feeding hunting birds, emphasizing that this meat is the most nourishing and it must be taken from a fat, young, healthy sheep. The preparation includes removing the sinews, fat, and bones, and then washing the meat in tepid water several times, until all the *ṣadīd*—the white foam that comes from the meat when it is boiled in water—is gone. The washing and rinsing process continues until the cooking water becomes clear and pure. After this, the meat is immersed in warm, but not boiling, water, cut into small pieces, dipped in the water and not squeezed, before being served to the bird. This meat can be given to the bird in slightly larger pieces than usual on condition that it is prepared according to the instructions. In summer it is better to dip the meat in cold water during the final stage of preparation before giving it to the bird. It is claimed that the best cut of the sheep is underneath the kidney fat on both sides of the spinal column. This part of the body are said to be similar in shape to two small fish, called *bushtamazajatayn* and *matnayn*. This description is fol-

⁴⁹ Al-Baladī, *al-Kāfi fī al-bayzarah*, p. 185.

⁵⁰ Al-Baladī, *al-Kāfi fī al-bayzarah*, pp. 183-184; Ibn Qushtumur, *al-Qānūn al-wāḍiḥ*, K.K., Ms. 978, fols. 81r°-82v°.

lowed by a long list of kinds of meat that are good for feeding birds, arranged in a hierarchical order from the best to the least good.⁵¹

Some kinds of meat were considered harmful for hunting birds. For example, beef was thought to be harmful, camel meat worse, buffalo (*jāmūs*) meat even worse, and worst of all horse meat. Other foods described as harmful to hunting birds were the meat of some types of fowl, particularly waterfowl such as the flamingo and goose, but also starling, raven, and roller. In addition, it was forbidden to feed hunting birds certain parts of the bird, such as bones that contained no marrow, the liver of water fowl which were completely forbidden for hunting birds, and also birds' gullets. When feeding a bird with the heart of another bird, it was important to cut it into two or three parts so as to remove all the blood, which was harmful. Birds' brains, on the other hand, were considered good for the bird, especially in winter. The most important rule was the prohibition on feeding birds with meat that had gone cold, or meat slaughtered the previous day. The hawking/falconry authors state that such meat is the source of every illness, comparing it to the effect of spoiled food on humans.⁵²

The veterinary sources reveal differences of opinions on many issues, including the subject discussed here. For example, one group of hawkers/falconers advocated feeding the young hawk many times a day in order to change its natural habit of eating all its food at one time. Opposed to these, another group argued that it was necessary to feed the hawk all at one time, just as it was used to eating in the wild before its capture, in order to accustom it the new human environment until it was gradually tamed.⁵³

Reliance on writers from the past was the cultural approach that existed in every genre of classic Arabic writing, and this also applies to the subjects treated here.⁵⁴ A hawker/falconer referred to as al-Ifranji, who is quoted in various *bayzarah* treatises, recommends not feeding hunting birds, especially the goshawk, with the meat of any animal that feeds on acorns (*ballūt*) or barley, because the meat of such an animal acquires a cold temperament, which might in turn cool the temperament of the hunt-

⁵¹ For the detailed description and the list of types of meat good for feeding hunting birds, see *Ibid.*, pp. 188-192.

⁵² *Ibid.*, p. 196.

⁵³ *Ibid.*, p. 182.

⁵⁴ This reliance on the past, and particularly the emphasis on the names of those quoted, is connected with the concept of oral transmission of the Hadith from the Prophet, in which the chain of authorities was even more important than the content itself. On the development of the oral law and religious tradition in Islam. See J. Robson, "Ḥadīth," *E.I.*², vol. III (1971), p. 23-29.

ing bird, causing severe damage to its health.⁵⁵ On the other hand, he writes, it is recommended to provide them with the meat of animals that feed on wheat, because this type of cereal has a hot temperament and therefore is most beneficial for hunting birds, which also have a hot temperament.⁵⁶ Al-Baladī also refers to Abū al-Ḥasan Aḥmad b. Khumārawayh, the author of a hawking/falconry book that is no longer extant, quoting some of his instructions for feeding hunting birds. According to this writer, the falcon should be prevented from eating any kind of chicken meat except for the meat of a fat black hen, and that, too, has to be served to the hunting bird only in the lack of other option. He also forbids feeding hunting birds the meat of water fowl, emphasizing that his instructions are the result of his personal experience in the field. He states that the meat of a sheep that has just been slaughtered and is still warm is also harmful, and it should be cooled first and only afterwards reheated a little in warm water or by holding it in the hand. According to the same writer, the hawker/falconer must not feed the bird meat that had been bitten with his teeth, particularly during the summer, when the meat has to be washed thoroughly before being served to the bird; otherwise it might contract a disease known as *al-wafrīnaj*.⁵⁷

Statements by people defined as “experienced” but without mention of specific names are often found in falconry treatises. For example, Al-Baladī quotes “the experts on hunting birds and the wisest in this profession,” who determined that the most suitable food for young hawks (*al-buzāt al-firākh*) accustomed to cold northern countries was mutton, whereas in hot countries they were fed the meat of kids or goats. During the moulting season (*qarnaṣah*) these birds were required to be fed with the meat of sheep that had reached the age of two.⁵⁸ The choice of meat and its suitability for hunting birds was based on the personal experience that many writers boasted of as well as on the theory of the temperaments. According to this latter criterion, the recommendation was to feed the birds with meat such as *shafnīn* (a kind of pigeon), *qaṭā*, and *fawākhīt*. The meat of these birds was dry and therefore suitable for feeding hawks, whose temperament was

⁵⁵ On this falconer, known as al-Ifranjī, see al-Baladī, *al-Kāfi fī al-bayzarah*, pp. 26–32.

⁵⁶ Al-Baladī, *al-Kāfi fī al-bayzarah*, p. 197.

⁵⁷ *Ibid.*

⁵⁸ The expression used, *thanīyy*, is derived from the name of the first tooth cut and also the first tooth lost. The classical dictionary *Lisān al-‘arab* gives the names of various animals whose age can be assessed by their loss of the *thanīyah*. This happens in camels at the age of six, in sheep at the beginning of the third year, and the same with goats and cows. See Ibn Manẓūr, “th-n-y,” *Lisān al-‘arab*, vol. XIV, p. 123.

defined as moist.⁵⁹ Despite its unchallenged theoretical base, the writers did not accept such explanations unquestioningly. Some of them disputed it, arguing that an earlier explanation is not necessarily valid for all types of hawks and may perhaps suit only some of them.⁶⁰ Thus, one such recommendation, stating that the goshawk growing in a temperate climate with pleasant weather can digest any kind of food, even the yolk of boiled eggs, fresh fish, mutton fried in oil, and more, is totally dismissed by al-Baladī, who explains that a hunting bird that has become accustomed to eating a certain type of meat will lose its ability to hunt as soon as its diet is changed, and may even become “one of those birds that feed on grass.”⁶¹

As could already be understood from the foregoing exposition, the authors of *bayzarah* treatises often made distinctions between different kinds of food suitable to different species of birds. For example, the Saker, the eagle and the *Zummaj* had to be fed smaller quantities in order to stimulate their natural hunting disposition, while for the goshawk, it was recommended to give larger portions.

The health maintenance of the Saker (*saqr*) was closely related to its feeding and hunting habits. The authors of *bayzarah* writings advised taking it out to hunt two hours after sunrise, despite its fear of eagles. The Saker was believed to have a moist temperament, which explained its low endurance of dryness compared to birds that had a hot, dry temperament, like the goshawk or the Peregrine.⁶² This fact was believed to affect both its hunting ability and the speed of its digestion. If the bird was taken out at dawn before it was hungry it would not be at its best as a hunter. To arouse its natural desire to hunt, the falconry writers suggest carrying the bird out on one's arm before sunrise in order to speed up its digestive process and give it time to get rid of remnants of food from the previous night, thus also ridding itself of humours that remained in the body. They also describe special methods of assessing this bird's appetite, for example, by examining and measuring the excreta. This was not an easy task, especially after it reached the ground and became mixed with soil. The sources describe a method whereby they measure the diameter of the droppings that spread in a circular shape on the ground, using the diameter of the coin as the unit of measurement.⁶³ This unique method, which indicates

⁵⁹ Al-Baladī, *al-Kāfi fī al-bayzarah*, p. 186.

⁶⁰ *Ibid.*

⁶¹ *Ibid.*, p. 184.

⁶² *Ibid.*

⁶³ It appears that this method was an innovation of falconry in the Mamluk period. The use of the *dirham* as a measurement unit for this purpose does not appear in the writings of falconers who preceded the period of al-Baladī.

a degree of professionalization, was used for general examination with all types of hunting birds in order to determine the quantity of undigested food that remained in the intestines, and thus judge the bird's fitness to hunt.

The Peregrine (*shāhīn*) is considered by writers of hawking and falconry literature as an extremely delicate bird that is especially vulnerable to unsuitable food.⁶⁴ These sensitive birds needed a great deal of attention, especially when they were young. Accumulated experience of treating Peregrine s led one of the authors to recommend feeding these birds with meat from the sheep's loins, stating at the same time that the falconer should vary the types of food given to the birds. For example, he suggests offering them the meat of young pigeons once a week, explaining, however, that feeding them pigeon meat is not a simple matter, and it is necessary to examine carefully the Peregrine's droppings; if the droppings are too thick and dry, the veterinarian has to restore the bird to a healthy condition by serving it pigeon meat that had received special treatment, by soaking the meat in hot water after washing it thoroughly, and then serving it to the falcon in small portions soaked in hot water without squeezing them, thus helping the bird to clear its stomach of food remnants. Al-Baladī notes that the Peregrine being particularly sensitive to the quality of the drinking water.⁶⁵

For the Sparrowhawk (*bāshiq*), Al-Baladī also recommends serving birds' meat once a week, or at least twice a month. This advice is based on the assumption that this meat has a hot dry temperament, which helps the hunting bird that eats it to clean itself of undesirable humours and prevent the accumulation of surplus food in the body. The same writer warns against using the meat of birds that are in rut, because the meat of birds during this period becomes tougher, useless, and even very harmful.⁶⁶

But beyond such recommendations that apply specifically to different bird species, the writers of *bayzarah* treatises emphasize that within each species there will always be some birds that are exceptions. Such distinctions can only be discerned by the handler who knows the bird personally.⁶⁷

⁶⁴ Al-Ḥasan b. al-Ḥusayn, *al-Bayzarah*, p. 104.

⁶⁵ Al-Baladī, *al-Kāfī fī al-bayzarah*, p. 181.

⁶⁶ *Ibid.*, p. 187.

⁶⁷ *Ibid.*, p. 177; al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, pp. 42-46. Figure 7 expressing the intimate relationship between the falconer and his falcon.

4. *Dogs*

Hunting treatises explain that the appropriate dietary regime for dogs is the best guarantee of their health and prevention of illnesses.⁶⁸ The writers describe the kinds of food, the quantities, feeding times, supplements, the effect of changes in the weather, the suitability of the type of food for the physical exertion involved in hunting, preparation for the hunt, slimming and fattening regimes, and more. They state, for example, that feeding once daily, at sunset, guarantees the hunting dog's health. This principle is based on the assessment of the time it takes for the dog to digest the food, and on the assumption that hunters could gain maximum benefit from the hunting dog's natural ability the next morning. The writers say explicitly that if the dog handlers do not take care to feed them properly in the evening, this is liable to lower their fitness and weaken them, even to the extent of exhaustion during the hunt. This rule applied only to the autumn and winter, whereas in the spring and summer the handlers were instructed to feed the dogs small portions several times a day because the days were longer and the oppressive heat might tire out the dogs.⁶⁹ The food itself was based mainly on meat soaked in beef soup, supplemented by bones stewed in a pot of soup until they disintegrated. Another piece of advice was to feed dogs tepid food, because hot food might make them ill, and in the hot summer it was preferable to give them cold food in small quantities so as to prevent vomiting, and they could also be given bread and milk or just milk. A special addition to food that is recommended in the sources is cumin,⁷⁰ and also salt, dates, lentils, a medicine called *al-liḥā*, salted fat, and more. Other types of meat supplements mentioned in some of the treatises are bulls' lungs, pork, soup made of cows' feet and heads, with the hair. If the handler noticed deterioration in the hunting dog's appetite, or if the dog refused to touch the food at all, he could arouse its appetite by rubbing its nose with vinegar mixed with ground lentils.⁷¹

⁶⁸ Ibn al-Ḥashshā' (attributed to), *al-Manṣūrī fī al-bayzarah*, p. 169; Ibn Mankalī, *Uns al-malā*, p. 142.

⁶⁹ *Ibid.*

⁷⁰ A long list of medical benefits is associated with cumin, especially with its seeds. Among these we may mention its effect on reducing flatulence, facilitating urination, and relieving abdominal pain. Although the main aim is connected with digestion, we find mention of many other uses of cumin, such as treatment of mosquito poisoning, swelling in the bladder, stopping nose bleeding or menstrual bleeding. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. IV, pp. 346-347.

⁷¹ Ibn al-Ḥashshā' (attributed to), *al-Manṣūrī fī al-bayzarah*, pp. 169-170.

The veterinary writers ascribe great importance to the preparation of the dog for hunting, and even use terms borrowed from the treatment of horses, such as *idmār*, the strict dietary regime imposed on the horse to reduce its weight and improve its physical fitness.⁷² According to the authors' instructions, the dog should be fed only once in 24 hours. If the handler wants to be good to the dog and improve its running speed he is instructed to give it only bread with oil added to make it tastier. Dog handlers are admonished to prevent dogs from eating near heaps of garbage. In the context of the slimming program, the quantity of food given to the dog should be strictly measured. According to these sources meat is not good for dogs at this time because it fattens and weakens them, thus decreasing their running speed during the chase.⁷³

Apart from the strict dietary regime discussed by several authors, we find a description of some actions that must be performed in order to guard the health of hunting dogs. It is emphasized that the dog is an animal that demands special attention, which includes stroking and combing its fur with pleasant caressing materials such as silk. The authors write that stroking with the hands, scratching, touching and suchlike basic actions that every dog handler has to perform in his daily care of the dog help to ensure the dog's good health.⁷⁴ It should be noted that similar references to dogs cannot be taken for granted in light of the religious texts referring to the dog as an unclean animal which should be kept at a distance and never touched.⁷⁵ Here, in the context of veterinary treatment of hunting animals, touching and stroking the dog are emphasized more than in the case of any other animal. This clearly indicates two different worlds, with one cultural system determined by strict rules anchored in religious traditions and the other related to a hunting culture with rules of its own, representing people who spent most of their time with animals.

Not all writers were ready to accept these methods. Ibn Mankalī, who apparently was not very fond of dogs, repeatedly emphasizes their impurity and warns hunters and dog handlers to avoid being defiled by them. He castigates hunters who allow their hounds to share their beds, describ-

⁷² “وينبغي أن يضمر مثل تضمير الفرس”—It is necessary [for the dog] to undergo *idmār* similar to horses,” Ibn Mankalī, *Uns al-malā*, p. 142. On horses see section A-1 in this Chapter.

⁷³ *Ibid.*

⁷⁴ *Ibid.*, p. 143; Ibn al-Hashshā' (attributed to), *al-Manṣūrī fī al-bayzarah*, p. 171.

⁷⁵ F. Viré, “Kalb,” *E.I.*², vol. IV (1978), pp. 489-492; Ibn al-Marzubān, *Tafḍīl al-kilāb 'alā kathīr mimman labisa al-thiyāb*, ed. 'Iṣām Muḥammad Shbārū, Beirut: Dār al-Taḍāmūn, 1992, pp. 14-15; Muslim, *al-Jāmi' al-ṣaḥīḥ*, vol. VI, pp. 156, 157, 163; al-Ḥarīrī, *al-Fiqh 'alā al-madhāhib al-arba'ah*, vol. I, pp. 1, 10-15, 27.

ing them as ignorant people who do not know or understand the religious laws. He also remarks that using silken cloths to warm dogs is a double offense: improper waste of money and the use of silk, which is regarded as luxurious behaviour, a serious offense in Islam.⁷⁶

Another rule that every dog handler had to know concerns sleep. The veterinary sources recommend letting dogs sleep near their handlers, because this makes them friendlier, more obedient, and even makes their smell more pleasant. It is not clear how the dogs' smell was made more pleasant by sleeping near their keepers, but the fact that these writers considered it elementary that the proximity of humans was beneficial to the animals' health is clearly unique in Islamic culture. The writers express special concern about the choice of sleeping places for the dogs and the duty to ensure their pleasant sleep by preparing a soft bed for them to lie on, explaining that this improves their sleep and enhances their natural hunting talent.⁷⁷

Taking the dogs out or freeing them to relieve themselves is also an important part of the dog's health maintenance. The authors advise taking each dog out separately and also providing separate living quarters, because living in a group can cause the spread of diseases, especially skin diseases.⁷⁸ This precaution reflects an awareness of contagion, a subject that will be discussed further on.⁷⁹

5. *Cheetahs*

The cheetah, or more precisely, the female cheetah, was a superb hunter by nature. Cheetahs are also among the most difficult animals to treat. Keeping them in good health therefore, was the aspiration of everyone who took care of them. Although they underwent a process of taming and training, the only way to keep them healthy in captivity was by ensuring that they received food that suited their physical activity. Preparation of the cheetah for hunting by maintaining a strict dietary regime is therefore a major topic in the discussion on cheetahs in most hunting treatises. After a tiring hunt, the professional keeper was responsible for restoring the cheetah to good health and complete fitness. Some veterinary sources feature recipes and advice for helping the cheetah to regain the lost weight,

⁷⁶ Ibn Mankalī, *Uns al-malā*, p. 143.

⁷⁷ Ibn al-Ḥashshā' (attributed to), *al-Manṣūrī fī al-bayzarah*, p. 171; Ibn Mankalī, *Uns al-malā*, p. 143; al-Ḥasan b. al-Ḥusayn, *al-Bayzarah*, pp. 141-142; S.K. Ms. 3566, fols. 120r^o-122r^o.

⁷⁸ Ibn al-Ḥashshā' (attributed to), *al-Manṣūrī fī al-bayzarah*, pp. 170-171.

⁷⁹ See Chapter VIII, section H.

focusing mainly on the kinds of meat and the quantities that should be given to the cheetah after a hunt. For example, we read that the best meat is from the sheep's thigh, which is also considered the best for feeding hunting birds, and the amount of meat served to the cheetah is seven rotls of lean meat completely free of fat or tendons.⁸⁰ The high quality of the meat also testifies to the importance of good nourishment as a major factor in preserving the health of this prestigious animal.

6. *Postal Pigeons*

The knowledge required of the keepers of the postal pigeons consisted largely of appropriate and adequate feeding, maintenance of hygiene, breeding, taming and training them for carrying messages tied to their bodies. Some treatises give detailed instructions to the keepers on how to prevent diseases that affect pigeons, with particular emphasis on the cleanliness of the columbarium. Resin composed of aromatic substances was used to prevent disease and promote reproduction; the fragrance of this resin was considered effective for enhancing the fertility of the pigeons.⁸¹ This resin was also used to destroy vermin.⁸² To keep cats away, they used a substance called *sadhāb*. Cats are dangerous to pigeons and to their eggs, and the strong smell of the *sadhāb* drove the cats away from the station. This substance was also effective against snakes, another danger to pigeons.⁸³ Primarily, the keepers' task was to obtain food suitable for pigeons, which consisted largely of beans. The expenditure on the upkeep of the postal pigeons was incorporated in the national budget.⁸⁴ The care of the pigeons also included making provisions for their mating, and great im-

⁸⁰ *Ibid.*, p. 170; S.K., *Ms. 3566*, fol. 121v^o; Ibn Mankalī, *Uns al-malā*, p. 137.

⁸¹ In order to encourage the males to approach the females, sugar was added to the females' food.

⁸² Youssef Ragheb, in a book on postal pigeons, deals with the question of relevant medical care, particularly in connection with the cleanliness of the columbarium and the use of strong smelling substances to prevent vermin from approaching the pigeons. See Youssef, *Les messagers*, p. 101. See also Silverstein, *Postal Systems*, pp. 165-185.

⁸³ Zakariyā b. Muḥammad b. Maḥmūd al-Qazwīnī (682/1283), *ʿAjāʾib al-makhlūqāt wa-gharāʾib al-mawjūdāt*, Beirut: Dār al-Sharq al-ʿArabī, n. d. p. 251.

⁸⁴ The pigeons were fed with beans, which are rich in protein and very nourishing. To sweeten the bitter taste of the beans, they were mixed with sugar, but only for the females. The females were kept separately from the males. In the Mamluk Empire they continued the ancient practise of measuring seeds without weighing them. The sultan's granaries devoted a special allowance of beans for the pigeons, equivalent to 375 liters for 100 pigeons per day. A simple calculation shows that one pigeon received 29 grams a day. Sugar was added to the food given to the females in order to encourage the males to approach and breed with them. Al-Maqrīzī, *al-Khiṭaṭ*, vol. III, p. 376.

portance was ascribed to the choice of suitable breeds.⁸⁵ Before the moulting season, the Mamluks released the pigeons (which were branded on the legs and beak with the name of the station to which they belonged), or allowed them to rest and did not send them out on tasks.⁸⁶

B. DIAGNOSTICS

1. *Diagnostic Theory*

In general, the methods of diagnosing diseases in animals resembled those used with humans, the basic principle being a process of elimination. That is to say, the veterinarian attempted to rule out the presence of different diseases, visible or hidden, and for this he had to know three factors: the “natural” or “true” condition of the body (as it is called in the sources *al-ṭabīʿī*), the natural external appearance of the body, and the balanced condition of the temperament. These three factors indicated the state of sickness or health. If the balance of the temperament was disturbed for any reason, whether external or internal, “too much or too little,” the veterinarian was expected to diagnose it clearly and determine the cause of the imbalance.⁸⁷

Professional hawkers and falconers, whose writings are based on their practical experience in the training and treatment of hunting birds, generally devote a chapter to explaining diagnostic methods, with a comprehensive description of all the signs that indicate disease. These chapters are generally based on the medical theory of the four humours.⁸⁸

Most of the hawking and falconry treatises stress that the falcon and the other hunting birds were created by God from the four humours and in this respect they are not different from man, but in the case of hunting birds the dominant humour in the body corresponds with the element of fire, which is hot and dry. Consequently, the bird’s dominant humour is said to be yellow bile. The writers emphasize that only if the hawker/falconer is familiar with the healthy state of the bird, its normal appearance and its state when the four humours are balanced can he diagnose cor-

⁸⁵ During the Abbasid period, an official was appointed to trace the lineage of the pigeons. According to al-Jāhīz, these were the most expensive birds. See al-Jāhīz, *Kitāb al-Hayawān*, vol. III, p. 212; al-Nuwayrī, *Nihāyat al-arab*, vol. I, p. 275.

⁸⁶ Al-Maqrīzī, *al-Khiṭaṭ*, vol. III, pp. 375-377.

⁸⁷ See, for example, al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, pp. 69, 74.

⁸⁸ See Chapter V, sections A-B.

rectly what has upset the balance of the humours in its body, an imbalance caused by the arousal of certain humours in the bird's body.⁸⁹

The writers often back up their arguments with quotations attributed to doctors of humans, especially those who were considered authorities in general medicine, such as Galen, Aristotle, Hippocrates, and Arsijānus.⁹⁰ But it was mostly Galen who provided the theoretical base of general medical knowledge, on which most of the Muslim authors of general medical books based their information, starting from the first translators such as Ḥunayn Ibn Ishāq and Yāḥyā Ibn al-Batrīq, to al-Rāzī and Ibn Sīnā. Similarly, writers of veterinary literature based their theoretical material on texts by Galen. This is particularly salient in diagnostics. For example, al-Baladī, of whom not much is known, wrote: "In order to know diseases of hunting birds, to be familiar with them and diagnose them, we must learn and know the writings of Galen in the matter of proofs and diagnoses of human diseases."⁹¹ He asserts that the analogy that he draws between human illnesses and animal illnesses can help veterinarians to diagnose diseases in animals using the Galenic method, especially in the case of hunting birds. He writes that if the symptoms are identified accurately the disease can be treated correctly, and this is done by classifying illnesses in different categories, wherein every disease is related to one of the three (out of the four) humours that exist in the body—blood, phlegm, and air [*sic*].⁹² Al-Baladī concurs with Galen's statement that illnesses can be diagnosed in three ways: (a) by the causes of the disease; (b) by external signs on the body; and (c) by inference based on experience.⁹³

⁸⁹ Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 203.

⁹⁰ Arsijānus the Wise, or as he appears in his Arabic name, Arsijānus al-Ḥakīm (أرسجأنس الحكيم) is quoted in statements relating to the diagnosis of diseases based on the doctor's practical experience and discernment. Apparently the veterinarians preferred to rely on Greek doctors with a practical approach rather than on theoreticians. They quote Arsijanus as saying: "It is better and safer to diagnose illnesses according to the external appearance instead of trying to give all kinds of medical preparations that might exacerbate the illness." Al-Quṭṭī, in his book on doctors' biographies, with a distorted name, apparently 'Aristijānus', writes that he was the one whom Galen attacked, adding that Galen falsified his medical statements and theories. See Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 232; 'Alī b. Yūsuf Abī al-Ḥasan al-Quṭṭī (d. 1248 CE.), *Kitāb Ikhbār al-'ulamā' bi-akhbār al-ḥukamā'*, Cairo: Maktabat al-Mutanabbī, n.d., p. 73; Ibn Abi Uṣaybi'ah, *Uyūn al-anbā'*, p. 58 (arshijānus); al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, p. 73.

⁹¹ Al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, p. 74; al-Baladī, *al-Kāfi fi al-bayzarah*, p. 232.

⁹² Yellow bile is regarded as a good humour that does not cause illness, hence it is not included among the factors that cause disease. See al-Baladī, *al-Kāfi fi al-bayzarah*, p. 233.

⁹³ Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 232.

Several falconry authors rely on the book attributed to Adham al-Ghiṭrīf, where we find statements by Galen and Hippocrates concerning the diagnosis of illnesses, saying that diagnosis can be based on three criteria: the patient's general condition, the damage done to the body by any sickness, and the "surplus humours." Applying this method to the treatment of birds, the recognition of birds' diseases, according to the same treatise, has to be made by three indications: the bird's general condition and its past illnesses, the damage done to its body by the disease, and the elimination of waste matter from the body.⁹⁴

Most of the authors who wrote on this subject divided the causes of disease into two categories: internal causes, called *bāṭin*, and external causes, *ẓāhir*. In the first category, according to al-Baladī, we can count the arousal of humours in the bird's body. Here too, reference is made to the three humours mentioned above as causes of illness.⁹⁵ He writes that an illness caused by an excess of blood will have a hot moist temperament, a disease caused by excess phlegm—a cold moist temperament, and a disease caused by an excess of air—the nature or temperament of black bile, cold and dry. He also explains why it is rare to find a disease of hunting birds caused by excess of yellow bile, because the natural or original temperament of hunting birds matches the temperament of this humour, warm and dry. In his opinion, if this humour increases in the bird's body, it will enhance its immunity (*qawiyat nafsahu*) and improve its health, because in order to treat illness and cure any disease the doctor has to restore the body to its natural condition.⁹⁶

Of the second category of diseases, those caused by external factors, al-Baladī writes that they are visible to the eye and can be examined using the senses. Among the causes of these diseases he counts heat, cold, smoke, dust, haemorrhage (*ṭarfah*), bruising, fractures, dislocation, *wahn* (a kind of weakness, debilitation or degeneration), open wounds, and many others that can be detected by the naked eye.⁹⁷ He devotes a chapter to describing the external signs of poor health and ascribes them individually to each disease.⁹⁸ Here too we see that the diagnostic methods that were prevalent among veterinarians resembled those used by doctors in examining humans.

⁹⁴ Al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, pp. 73-74.

⁹⁵ Al-Baladī, *al-Kāfi fī al-bayzarah*, p. 208.

⁹⁶ *Ibid.*, p. 207.

⁹⁷ *Ibid.*

⁹⁸ *Ibid.*, pp. 208-231.

2. Bodily Secretions

The veterinarians' main diagnostic method was examination of the bodily secretions. This method is described in great detail particularly in the treatises dedicated to treatment of birds. Al-Baladī, whose treatise includes a rich description of various methods of diagnosis based on his personal experience in treating hunting birds, offers several criteria for diagnosing diseases by the secretions, even before the progress of the disease and the appearance of external signs on the body. His explanations derive from the medical perception that imputes disease to secretions trapped in the body and unable to escape naturally.⁹⁹ This practise was compatible with the diagnostic methods used in general medicine. Ibn Sinā, for example, refers to the elimination of surplus matter from the body as an important measure of the body's temperament. He also mentions the three ways by which the body eliminates surplus—through faeces, urine, and sweat—and thus balances the four humours.¹⁰⁰

Compared to the three secretions mentioned by Ibn Sinā concerning the human body, hawking and falconry writers count nine secretions of birds that can serve in examining the bird's state of health.¹⁰¹ These are:

1. Water dropping from the eyes, such as tears.
2. Water dripping from the beak—*mansir*. The writers state that a bird is liable to secrete fluid from the beak while eating.
3. *Raymaj*—the bird's customary secretion of fluid from the mouth every morning.
4. Everything that the bird vomits due to satiation, and surplus food that is eliminated from the body in an unnatural way.
5. Feathers shed from the body, also counted as a kind of secretion.
6. The bird's droppings.
7. Sweat.
8. Oil secreted from a gland at the back of the body, *zamkāh*. The bird removes the oil with its beak every morning, using it for preening its wing feathers, the feet, the talons, and the thighs and abdomen.
9. A white secretion from the base of the feathers, like fine white powder or dust, also described as "similar to lice that appear in the hair

⁹⁹ *Ibid.*, pp. 230-231.

¹⁰⁰ Ibn Sinā, *al-Qānūn fī al-ṭibb*, vol. I (book 1), p. 159.

¹⁰¹ Al-Baladī follows al-Ghiṭrīf in enumerating nine types of secretions of birds that are examined when the bird is sick. See al-Baladī, *al-Kāfi fī al-bayzarah*, pp. 230-231; al-Ghiṭrīf, *Kitāb Ḍawāri al-ṭayr*, pp. 79-80.

of children.” This secretion, explained as a result of dehydration, is not clearly defined.

According to al-Baladī, each of these nine secretions, if it is “imprisoned” in the body and for some reason the body does not succeed in ejecting it naturally, would become a threat to the health of the bird. As for diseases that can be diagnosed more simply since they are visible to the eye, he sees no reason to discuss them in this context.¹⁰²

Several writers explain that the bird has only one digestive system, which also contains the urinary tract through which it emits both faeces and urine mixed together. Falconry writers declare that the examination of birds’ droppings is equivalent to the testing of urine in humans.¹⁰³ Ibn Qushtumur states that examining the droppings of a hunting bird is similar to examining a human’s urine collected in a bottle.¹⁰⁴ The consistency of the droppings (soft or hard), and the colour (dark or light), the frequency, the difficulty or pain while excreting them, all these indications are taken into account during the diagnosis. Hawking/Falconry writers refer to the examination of the droppings as one of the major methods of testing the health of hunting birds, and state that this test is more reliable than urine testing in humans, because the bird does not eat many kinds of food and if the food is suitable for its digestion, this is clearly manifested in the droppings.¹⁰⁵ Avoidance of food is one of the symptoms of illness, and this is also reflected in the droppings because the bird’s digestive process is rapid. The ejection of food waste does not go unseen by the discerning veterinarian, and the veterinarian sources provide indications to help him in his diagnosis. For example, the droppings of a healthy bird are ripe (*naḍīj*), with an even consistency, and they emerge in a continuous flow. Their colour is white with a little black, they look soft and they are dry and easy to detach from their place and move elsewhere. All these signs indicate the absence of internal disease.¹⁰⁶

¹⁰² Al-Baladi, *al-Kāfi fi al-bayzarah*, pp. 230-231.

¹⁰³ The anonymous author of a falconry manuscript writes: “You should know that birds’ droppings are equivalent to urine in humans by which we diagnose illnesses” (اعلم أن الذرق) (للجوارح بمنزلة البول للانسان تستدل به), *Kitāb al-Bayṭarah li-al-wuḥūsh*, B.L., Ms. ADD. 23,417, fols. 169v^o–170r^o; see also al-Ḥasan b. al-Ḥusayn, *al-Bayzarah*, pp. 79-80.

¹⁰⁴ “وقد جعلنا الذرق مثالا ببول الانسان الذي يعتبر به الطبيب صحة جسده إذا رآه في القارورة”: Ibn Qushtumur, *al-Qānūn al-wāḍiḥ*, K.K., Ms. 978, fols. 83v^o–84v^o.

¹⁰⁵ Al-Ḥasan b. al-Ḥusayn, *al-Bayzarah*, pp. 79-80.

¹⁰⁶ Kushājīm, *Kitāb al-Maṣaʿid wa-al-maṭārid*, p. 115; ‘Abd al-Raḥmān Raʿfat al-Bāshā, *al-Ṣayd ʿind al-ʿarab*, p. 174.

Ibn Sīnā, in a chapter on methods of examining human urine and faeces, lists seven kinds of tests: colour, texture, clarity or cloudiness of urine, blood sedimentation, the amount of urine, its smell and the kind of foam that arises from it. In addition to these seven measures, he remarks that there are doctors who add two more tests: manual examination of the faeces and urine, and tasting them. He personally rejects these two methods, not because they are not theoretically or scientifically correct, but out of repulsion.¹⁰⁷ In contrast, in hawking/falconry treatises, tasting the droppings is described as a method of diagnosing certain diseases without any reservation. This method is particularly recommended in the case of serious ailments, such as liver diseases. Al-Baladī, for example, states that in order to diagnose a disease known as *al-jīṣṣ* it is essential to taste the droppings, explaining that droppings with a salty or sweet taste indicate an illness that originates in the liver.¹⁰⁸

One of the diagnostic methods suggested in the falconry literature is to feed the bird a certain kind of food and observe its effect on the body. This method appears in several falconry treatises, particularly in the case of internal illnesses of unknown origin, and it is described as suitable for different kinds of animals. The hawker/falconer who has not succeeded in identifying the bird's disease is advised to use various types of food to help him make a diagnosis, and especially to determine its temperament. This largely dictates the manner of treatment or the food that will eventually provide a cure.¹⁰⁹ One writer suggests feeding the falcon tortoise meat, because it has a dry temperament and can clarify the precise nature of the disease. In particular, he writes, tortoise meat can help the veterinarian to determine the nature of a hidden illness and the type of humour that is affected by it, and this, in turn, can help him to determine the appropriate medication. The same writer adds that tortoise meat is suitable for diagnosing illnesses that mainly affect goshawks, and in order to reach a correct diagnosis he provides instructions on how to deal with this meat and strip it of the large blood vessels before giving it to the hawk.¹¹⁰ The author does not go into much detail about how the meat affects the bird, but one may assume that the diagnosis is based on the colour and form of the droppings. Thus he returns to the basic examination of the effect of food on the faeces,

¹⁰⁷ Ibn Sīnā, *al-Qānūn fi al-ṭibb*, vol. I (book 1), p. 179.

¹⁰⁸ "ويكون طعم سلاحه مالحاً أو حلواً": al-Baladī, *al-Kāfi fi al-bayzarah*, p. 222.

¹⁰⁹ Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 237; al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, p. 47.

¹¹⁰ Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 237; al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, p. 67.

that is to say, linking the classical diagnosis based on the form, colour, smell, and density of the droppings with a method based on the effects of a certain type of food given to the bird for this purpose. Another recipe, suggested by al-Ghiṭrīf for examining the condition of a goshawk before purchasing it, is also composed of special kinds of meat, such as skinned mice, buzzards, baby pigeons, and black hens. It should also be fed a small amount of a special *theriaca*, called *al-tiryāq al-khālīs*, or given a sugar-like substance—*ṭabarzad*—to smell. After three days of this dietary regime the hawk's physical condition would be visible to the eye and its disease can be diagnosed.¹¹¹ Similarly, al-Baladī recommends mixing iron filings with the meat served to the hunting bird in order to determine its state of health. In this case, too, the explanation lies in the digestion of the iron filings; if the bird emits bloody droppings, it is a sign of sickness.¹¹²

The hawking and falconry writers emphasize that a good and learned doctor does not confine himself to one sole method of diagnosis. Those who treat hunting birds must also take into account the range of evidence and symptoms rather than relying solely on testing the bird's droppings, no matter how expert they are in this method. These writers accompany their admonition with several examples that cast doubt on the reliability of diagnoses based on a single test. For instance, droppings of a yellowish colour generally indicate a severe and almost incurable disease called *iṣṭārim* or *iṣṭārim*,¹¹³ but if at the same time the bird's eyes are clear, it is full-breasted and its overall condition is good, these signs cancel out the initial diagnosis, based solely on the colour of the droppings. Here we see an attempt by veterinarians to present a more complex picture of diagnostics.¹¹⁴ With regard to the specific disease of *iṣṭārim*, some of the writers compare it to tuberculosis (*sill*), which attacks humans, enfeebling them and causing weight loss—one of the most difficult diseases to cure. They mention that both of these diseases are severe and no-one who contracts

¹¹¹ Al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, pp. 46-47.

¹¹² Al-Baladī, *al-Kāfi fī al-bayzarah*, p. 203.

¹¹³ Al-Ghiṭrīf's treatise specifies that this disease, sometimes also referred to as *al-ḥaṣāh* or *al-jīṣ*, lowers the bird's physical fitness and debilitates it. The anus becomes constricted, causing difficulty in the emission of droppings. The bird excretes yellow droppings that contain worms. Al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, p. 81; al-Ḥasan b. al-Ḥusayn, *al-Bayzarah*, p. 80.

¹¹⁴ Al-Ḥasan b. al-Ḥusayn, *al-Bayzarah*, p. 80; al-Baladī, *al-Kāfi fī al-bayzarah*, pp. 220-223; al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, p. 70.

them, either human or animal, can be in good overall condition, nor can they be fat.¹¹⁵

Birds of prey also eliminate food waste by regurgitating it through the mouth. This emission of pellets was called *ramj*, *raymaj*, or *raymajah*. The hawking and falconry writers refer to it as faeces and compare it to the excretion of stools in other animals. Hence, the *raymaj* had to be examined as part of the diagnostic process. It is also stated that the time of casting pellets, whether by day or by night, is one of the indications to be taken into account, in addition to its texture, its colour, and its smell. The latter is of great importance in the diagnosis. According to the *bayzarah* treatises, emission of dry pellets indicates good health, while moist ones or an unpleasant smell indicate that there are remains of excess humours in the body. Emission of the pellets through the droppings is considered unusual and unhealthy, showing that the bird has swallowed an insufficient quantity of feathers with its food, for feathers help the bird to digest the meat, and a lack of feathers in the food leads to difficulty in collecting the pellets in the crop, and to their emission through the droppings.¹¹⁶

Clearly, this diagnostic method, like the other methods described in veterinary writings on birds, testifies that considerable knowledge, expertise, and discernment were required in diagnosing birds' diseases, because the bird, after all, is a small animal and the slightest change could be a sign of illness. Therefore, beyond the expertise and skill, the care of birds entailed almost constant presence and observation by the hawker/falconer.

With regard to horses and other big animals, diagnosing disease by feeding with a certain kind of food was also recommended when the veterinarian was asked to distinguish between an illness caused by exhaustion and a state of fever, which has a similar effect on the body. In the former case the animal is said to be able to eat its food, whereas in the latter case the animal loses its appetite and does not approach the food at all. The use of this diagnostic method dictated the treatment. If the illness was a kind of fever it was treated by bloodletting, one of the conventional treatments of the time. In the case of debilitation caused by exhaustion the veterinarians avoided bloodletting because this could exacerbate the animal's condition and cause real damage.¹¹⁷

¹¹⁵ Al-Ḥasan b. al-Ḥusayn, *al-Bayzarah*, p. 80; al-Baladī, *al-Kāfi fi al-bayzarah*, p. 222; al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, p. 61.

¹¹⁶ Al-Ḥasan b. al-Ḥusayn, *al-Bayzarah*, p. 81; al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, p. 79; K.K., Ms. 978, fols. 83v^o-84r^o.

¹¹⁷ Anonymous, *al-Jawād al-ʿarabī*, p. 303.

In the case of human patients, the colour, clarity and consistency of the urine, the manner of urinating, the strength of its flow, whether it came out in jerks or in one continuous flow, the behaviour while urinating, blood in the urine, its smell and its taste—all of these criteria were examined by the doctor in order to reach a diagnosis.¹¹⁸ Ibn Sīnā presents several important criteria for examining urine and emphasizes the necessity of ensuring the cleanliness of the bottles used for collecting the urine and washing them thoroughly of traces of previous samples. The veterinary sources also ascribe great importance to the testing of animals' urine for diagnostic purposes. Generally, the initial diagnosis of a problem in the urinary system, including the kidneys, was based on difficulty in urinating. The examination of urine also included its nature and colour. For example, referring to a disease that originates in the horse's kidneys, Abū Bakr states that the urine emerges in a slight trickle, with great effort, its colour is cloudy and bloody, and may even resemble dough.¹¹⁹

3. *Testing the Pulse*

Ibn Sīnā refers to pulse testing as one of the basic examinations that every doctor has to perform when examining a person. He devotes an exceptionally long chapter to the subject, describing changes in the rate and strength of the pulse that may result from various factors. For example, the pulse may vary according to age, sex, temperament, state of health, physical exertion, pregnancy, pains that affect the pulse, growth, the state of sleep or wakefulness, and even emotional states such as anger. According to this view, the seasons of the year and the climate in different countries also affect the human pulse. Ibn Sīnā's definition of the pulse is also based on the Galenic theory, which defines the pulse as a movement of vessels that contain the soul. This movement consists of alternating expansion and contraction, the purpose of which is to cool the soul with the breath.¹²⁰ Ibn Sīnā enumerates nine different kinds of pulse which he calls "simple," and others that he calls "complex," classified according to the duration of the pulse, its strength, speed, and rhythm.¹²¹ These assessments were appar-

¹¹⁸ Ibn Sīnā, *al-Qānūn fī al-ṭibb*, vol. I (book 1), p. 136.

¹¹⁹ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 93. On urine retention, see also below, section 4.

¹²⁰ Ibn Sīnā, *al-Qānūn fī al-ṭibb*, vol. I (book 1), p. 165.

¹²¹ The general chapter on the pulse in Ibn Sīnā's treatise contains 19 sections, each discussing the subject from different aspects, such as type of pulse, names of the pulse, factors that affect the pulse, and so forth. See *ibid.*, pp. 165-178.

ently based on the experience of the person who measured them and not on objective numerical data.

Although this kind of deep-reaching diagnosis described by Ibn Sīnā is not found in veterinary books, the checking of the pulse often appears as a basic diagnostic method to be employed with various hunting birds,¹²² and veterinary sources emphasize that experienced and knowledgeable handlers of hunting birds can diagnose illness by feeling the pulse. With falcons the pulse can be tested in the joint of the femur and the wings (*ru'ūs al-fakhdhayn* = 'the heads of the thighs'), which, according to the *bayzarah* sources, is the ideal place for taking the pulse. A balanced pulse rate indicates a state of good health, whereas extreme fluctuations of the pulse indicate that the balanced nature of the hawk or falcon is upset due to an illness that is not visible to the eye and affects mainly internal organs.¹²³

A hawking/falconry manuscript entitled *Baznameh* features a description of testing a goshawk's pulse. The author describes the place where the pulse can be felt, comparing it with pulse measurement in humans.¹²⁴ This author does not provide any numerical criteria by which to learn about the precise measurement of the pulse.

Pulse measurement is barely mentioned in veterinary treatises dealing with large animals such as horses, mules, donkeys, and camels, despite the fact that the chapter on arteries and veins that are suitable for bloodletting occupies a central place in these treatises.¹²⁵ Apparently, the veterinarians who treated large animals did not ascribe much importance to pulse measurement. This might have been connected to the doubt whether it could provide a reliable indication of the animal's health.

4. *Diagnosis by Behaviour and External Manifestations*

Diagnosis of disease and assessment of the animal's general health based on external signs and symptoms is emphasized in hawking and falconry treatises. The writers state repeatedly that it is the hawker/falconer's duty to examine the hunting bird thoroughly and pay attention to every slight

¹²² Al-Ghiṭrīf states that some falconers regard measuring the pulse of the two arteries at the base of the wings as sufficient for diagnosing the state of the bird. He describes several kinds of pulse, for example, a pulse that fluctuates between slow and quick, a steady, unchanging pulse, a pulse that is strong, weak fast, slow, etc. See al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, pp. 70–71.

¹²³ Al-Baladī, *al-Kāfi fī al-bayzarah*, p. 204; al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, pp. 70–71; K.K., Ms. 978, fol. 82v^o.

¹²⁴ See *Baznameh*, B.L., Ms. OR. 8787, fol. 65r^o.

¹²⁵ E.g. Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 113–115.

change, since these are extremely sensitive creatures that might easily contract diseases.

It is the duty of the hawker/falconer to check the health of the hunting birds thoroughly every morning at dawn, before it begins to wake up in its cage (*kandarah*). Al-Ghiṭrīf emphasizes that special attention must be paid to the bird's first emission of wind together with the first motion of its wings at daybreak, signalling good health.¹²⁶ The early morning examination also includes checking whether the bird excreted droppings during the night, watching the bird's stretching of its body and the first movements of the bird's wings on waking up to see whether it raises the wings in a regular and symmetrical manner, and whether it flaps them together (a motion like handclapping in humans).

On a regular and a daily basis, the hawker/falconer is required to observe the manner in which the bird stretches its body when getting up to eat, and how it stretches its neck upward as if looking for something. The bird's spontaneous reflexive response when being stroked by the falconer is also an important indication; if the bird responds immediately every time the handler strokes its back and chest, this is a sign of good health. In particular the falconer should note whether the bird stretches with pleasure and responds in a lively manner to his touch.¹²⁷ Another way of diagnosing health problems is by observing whether the bird turns its head toward its oil gland (*zamkāh* or *zimmik*), and whether it takes out the oily secretion with its beak and preens all its feathers as usual. This action is presented as one of the basic and natural actions that indicate a state of good health in the bird.¹²⁸

The health of a hunting bird can also be examined by observing its behaviour, the sprightliness of its movements, its energy, the state of its eyes and their glance, including their colour, whether they are clear and glowing or cloudy. Other important signs are the bird's appetite (birds are said to usually express hunger every three hours), the state of its droppings, and the bird's manner of eating meat.¹²⁹

To facilitate the diagnosis, certain criteria are listed in the veterinary treatises. For example, they provide a separate description of each species

¹²⁶ Al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, p. 70: {وما يدلنا على صحة البازي وغيره من جميع الجوارح أنا: "تري منها الصحيح إذا أراد التحرك عند ورود الضوء عليه فحرك ذنبه فضرط".}

¹²⁷ Al-Baladi, *al-Kāfi fi al-bayzarah*, p. 204.

¹²⁸ *Ibid.*; al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, pp. 70, 72, 79.

¹²⁹ Al-Baladi, *al-Kāfi fi al-bayzarah*, p. 204; al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, p. 70; K.K., *Ms. Fatih 4566*, fols. 99v^o—100r^o.

of hunting bird in a state of good health. It should be fat to the appropriate extent, with clean, glowing colours, as if oil were dripping from its feathers. Great stress is laid on examination of the tail feathers, which should be lustrous with clear colours. Even the mood of the bird as reflected in its face serves as a criterion in its medical examination.¹³⁰ Another physical examination discussed in the veterinary sources concerns the foot, which is also important for the health of the bird: a dry foot with cracks or swellings indicates illness.¹³¹ The shedding of feathers is also discussed, as well as the motion of the wings.¹³²

For establishing which part of the body is injured or painful the falconer is advised to observe how the bird turns its head when eating. If it looks directly ahead, opens its beak and swallows the food symmetrically on both sides, this is a sign of good health, but if it turns to one side when swallowing and chews the meat on one side of the mouth, this indicates a problem on the side with which it does not chew.¹³³

Another sign to be observed is the manner in which the hawk lubricates its wings with its beak. If it cleans one wing and ignores the other, this indicates that the wing that it avoids lubricating is hurt and has to be examined thoroughly.¹³⁴ Another method described in the sources is connected with the hawk's physical activity while hunting. If, for example, when the hawk flies the bird at the quarry, the quarry swerves aside and the hawk cannot turn to that direction, this indicates a medical problem on that side.¹³⁵

The bird's behaviour during the hunt is another indication of its state of health, and the veterinary sources describe various behaviours that indicate illness. For example, a hawk that does not attack the prey, or attacks more weakly than usual, is not in good health. If the hawk shakes its body a great deal and cannot move its neck or head while shaking, this is a sign of illness in the head or neck.¹³⁶ The same sources also refer to the falcon's psychological condition as manifested in its behaviour, remarking that angry and irritable behaviour and a trembling face are indications of in-

¹³⁰ K.K., *Ms.* 978, fol. 89^o.

¹³¹ Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 205.

¹³² *Ibid.*

¹³³ *Ibid.*, p. 203; al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, p. 72.

¹³⁴ Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 204; al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, pp. 70, 72, 79.

¹³⁵ Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 205.

¹³⁶ *Ibid.*, pp. 204-205.

ternal illness.¹³⁷ This description of psychological responses and social behaviour as evidence of internal illness and injury is unique to veterinary medicine, which ascribed great importance to animals' psychological states, as we will see below.

Passing now to horses and other big animals, Abū Bakr al-Bayṭār enumerates the diseases that attack them, going through the different parts of the body and discussing all the signs by which the disease can be identified. He begins the discussion with a list of 24 skin diseases, all of which he describes as identifiable by their effect on the horse's skin.¹³⁸ Such a large number of diseases is especially impressive when we take into account that this is a branch of medicine in which diagnosis is difficult even today, and it illustrates the fact that in terms of diagnostics the veterinarians were mainly concerned with external symptoms. Some of the skin conditions described are the result of external wounds or snake or scorpion bites, as well as bites of various predatory animals, but most of them are connected with skin diseases, of which he mentions some fifteen different kinds.¹³⁹ Abū Bakr devotes a separate section to each of these illnesses, describing the signs by which it can be identified, although the same signs may appear in different illnesses. The diagnosis is based mainly on the colour of the sores, the places where they appear, their size, the amount and the colour of pus they exude, and the speed with which they spread on the skin. It was taken for granted that skin diseases might be contagious, and separation of infected animals from the rest of the herd was strictly observed.¹⁴⁰

One of the interesting methods of diagnostics is related to anaemia, known in Arabic as "poor blood" or "poverty of the blood."¹⁴¹ Al-Malik al-Ashraf, author of *al-Mughnī fi al-Bayṭarah*, devotes a chapter to anaemia in horses, listing its causes, describing its various signs and recommending the best treatment for it. Undoubtedly, this illness was the hardest and most complicated to diagnose, especially in light of the fact that the experts at that time ignored the composition of the blood as we know it today. The Mamluk veterinary sources refer to the diagnosis of anaemia by certain visible signs, particularly the swelling of the horse's eyes, accompanied by

¹³⁷ *Ibid.*

¹³⁸ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 9-11.

¹³⁹ The names of the skin diseases are *al-baraṣ*, *al-bahaq*, *al-jarab*, *al-sawdā*, *al-ṣafrā*, *al-sharā*, *al-tawālīl*, *al-damāmīl*, *al-tūtah*, *al-aklah*, *al-khumlah*, *dā' al-ḥayyah* (snake disease), *dā' al-tha'lab* (fox disease), *al-ḥirdawn* (lizard disease), *al-daran* disease. Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 9.

¹⁴⁰ This aspect will be elaborated in chapter VII.

¹⁴¹ Al-Malik al-Ashraf, *al-Mughnī*, pp. 64-65.

tears flowing. Anaemia also affects the horse's appetite, which is attributed to the type of food given to the horse, particularly a plant called *al-abīd al-akhḍar*.¹⁴²

We also find in the veterinary literature diagnosis of a condition the opposite of anaemia, an accumulation of excessive blood in the body. This condition is defined in one of the sources as *qafz al-damm*, which may be literally translated as "jumping of the blood." Clearly, the medical theory of the four humours was what dictated this diagnosis, although generally speaking in questions of diagnosis the veterinarians emphasized the visible symptoms on the animal's body, such as sores on the camel's skin, indicating an excess of blood in the body. The treatment recommended for excess blood was also bloodletting.¹⁴³

External examination of the body, especially the skin, sometimes included the tongue and the inside of the eyelids. One description that appears in the veterinary literature refers to doctors of Indian origin, who turned the horse's eyelids over in order to check for a disease that affected many horses that had arrived from Yemen. The author describes this method in referring to an epidemic that killed many horses in the year 728/1327. He emphasizes that this examination enabled the doctors to detect the early symptoms of the disease by the yellowish colour that appeared on the inside of the eyelids.¹⁴⁴

Abū Bakr describes retention of urine without mentioning the cause of the illness. In this case, too, the diagnosis is based on the act of urinating and the quantity discharged from the body.¹⁴⁵ General retention of urine in horses and camels may be extremely painful and it is not difficult to diagnose; it is enough to watch the animal's behaviour carefully and regularly when it is urinating. Al-Malik al-Mujāhid writes of total retention of urine, called *ḥaṣr al-bawl* as an illness that affects both horses and camels. In the case of horses, he describes the symptoms of this condition, including the behaviour of a horse attempting unsuccessfully to urinate. Other signs that he describes are excessive sweating, tension, and irritability, and even falling down and being unable to get up. Al-Malik al-Mujāhid does not describe the effect of the same disease on camels.¹⁴⁶

¹⁴² Al-Malik al-Mujāhid, *al-Aqwāl al-Kāfiyah*, p. 237.

¹⁴³ *Ibid.*, p. 389; al-Malik al-Ashraf, *al-Mughnī*, p. 185.

¹⁴⁴ Al-Malik al-Mujāhid, *al-Aqwāl al-Kāfiyah*, p. 275.

¹⁴⁵ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 75.

¹⁴⁶ Al-Malik al-Mujāhid, *al-Aqwāl al-Kāfiyah*, pp. 262, 393.

5. *Diagnosis of Internal Diseases*

One of the major diagnostic problems in the medieval period was the precise diagnosis of internal diseases. It may be said that this problem still exists today and the most advanced methods of diagnosis are still sometimes noticeably lacking in accuracy in the case of internal illnesses. In the Middle Ages the veterinarians' treatment of internal diseases (mostly of horses, donkeys and camels) was largely determined by the diagnostic methods that were practised in general medicine and were based mainly on the doctor's or veterinarian's personal skill and accuracy in diagnosis by external examination of the body. We rarely find reports of an attempt to diagnose illnesses that affect vital internal organs such as the heart, liver, spleen, brain, intestines, and stomach by surgical intervention, because this carried very high risk. Surgery was conducted on some of these organs, but only in extreme cases when there was no alternative treatment, and not for diagnostic purposes. There are a few reports of surgery performed by veterinary doctors to determine the cause of death, but this, of course, is another matter.¹⁴⁷

The greatest difficulty in treating animals is the patient's inability to speak or point to the exact place where they feel pain.¹⁴⁸ Therefore, Mamluk veterinarians used some diagnostic methods that are still used today in human medicine, such as palpating the abdomen and observing the patient's reaction to see if it reveals pain, or manual examination of swelling, inflammation, growths, and so forth in internal organs.¹⁴⁹ Nevertheless, there is barely an internal illness of animals that the veterinary sources do not mention.

¹⁴⁷ A document kept in the Venetian State Archives features a description of the shipment of three female dogs from Venice to Istanbul, apparently sent to the sultan's wife. The dogs arrived severely ill. One of them died immediately and the other two were quickly brought to the sultan's court before the same fate overtook them. According to the text, one doctor conducted a post mortem on the dead dog and found its stomach full of worms. Although this evidence comes from a later period, and it is also not clear whether that doctor was a doctor of humans or a veterinarian, it provides interesting evidence regarding post mortems performed on animals. See Archivio di Stato di Venezia, *Senato, Segreta, Dispacci da Costanripoli*, filza 17, fols. 277r^o -277v^o. (This document was brought to my attention by Prof. Benjamin Arbel). The author of an unpublished veterinary treatise mentions that Galen attempted to learn human physiology on the basis of post mortems conducted on monkeys, see B.L., *Ms. ADD. 21.102* (996), fol. 62r^o.

¹⁴⁸ Ibn Bassām al-Muḥtasib, *Nihāyat al-rutbah*, p. 124; Ibn al-Ukhūwah, *Ma'ālim al-qurbā*, p. 150.

¹⁴⁹ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 31, 35-37, 41, 51, 53, 59, 77, 83, 85, 93; al-Šāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, pp. 322, 326, 327, 337, 346.

Sometimes the diagnosis of internal diseases is explained in general terms without pointing to a specific organ. For example, severe abdominal pains are explained as resulting from an undefined disease.¹⁵⁰ This diagnosis is based solely on external signs such as trembling of the whole body, limpness of the neck, and foaming at the mouth. We learn from this diagnosis that the veterinarians referred to a special category of internal disease that could be identified without defining the specific organ that was affected. The symptoms of such a disease included pus or a thick odourless discharge from the nostrils, or constant weeping, with no loss of appetite.¹⁵¹ Diagnosis of a disease that causes severe headaches also often appears in the sources with no mention of its name. Such headaches are identified by several signs: the head droops and the horse is unable to raise it, the eyes become cloudy and weepy, and the horse cannot close its eyes. Also, the veterinarian can discern the veins in the whites of the eyes.¹⁵² Although the diagnosis of this disease is similar to the one described above, originating from severe abdominal pains, the distinction between the two diseases is related to the appetite. In the case of headaches the horse has no appetite and does not eat, lies in its place and cannot stand up, whereas in the case of stomach pains the horse's appetite is not affected.¹⁵³

In addition to general diagnosis of pains in the abdomen or the head, the veterinary writers attempted to investigate diseases and pains originating in specific internal organs, and in this way to diagnose such ailments. In most of the sources we find reference to diseases that affect every one of the important internal organs, such as the lungs,¹⁵⁴ heart,¹⁵⁵ intestines,¹⁵⁶ liver,¹⁵⁷ spleen,¹⁵⁸ kidneys,¹⁵⁹ stomach, and even the

¹⁵⁰ Al-Šāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 339; Anonymous, *al-Jawād al-ʿarabī*, p. 132.

¹⁵¹ Al-Šāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 326; Anonymous, *al-Jawād al-ʿarabī*, p. 124.

¹⁵² Al-Šāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, pp. 333-334; Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 19.

¹⁵³ Al-Šāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 326.

¹⁵⁴ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 93; al-Šāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, pp. 343-344; Anonymous, *al-Jawād al-ʿarabī*, p. 134.

¹⁵⁵ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 91; al-Šāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, pp. 336-337; Anonymous, *al-Jawād al-ʿarabī*, p. 130.

¹⁵⁶ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 85-87; al-Šāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 345; Anonymous, *al-Jawād al-ʿarabī*, p. 134.

¹⁵⁷ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 87-89; al-Šāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 336; Anonymous, *al-Jawād al-ʿarabī*, p. 129.

¹⁵⁸ Al-Šāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 337; Anonymous, *al-Jawād al-ʿarabī*, p. 130.

¹⁵⁹ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 93.

navel.¹⁶⁰ Generally, they also describe signs that might help the veterinarian to diagnose illnesses originating in these organs. An illness that originates in the heart, for example, defined in the sources as a growth, causes sharp pains in the area of the heart. Diagnosis in this case is based on observing the animal's external behaviour. The typical symptoms include constant scratching and irritability, falling on the face and the knees, and leaning against something when trying to get up. Other signs are copious sweating in the left armpit, the head alternately drooping and upraised, the forelegs resting on the floor as in the illness known as *al-ḥafi* or *al-ḥamar*, and sometimes stretched forward in an unnatural manner. Difficulties in urinating, from dripping to total retention, are also mentioned in this case.¹⁶¹ Clearly this reveals a high level of diagnosis.

With regard to the diagnosis of diseases of the spleen, the main difference is in the place of the swelling, which appears on the left side in the case of the spleen, while the rest of the symptoms identified in liver problems also appear in diseases of the spleen. These symptoms include problems with walking and balance, trembling, breathing difficulties, and general weakness of the body, leading to slow movement.¹⁶² Pain originating in the stomach is identified by general weakness and frailty, and avoidance of food. Another sign that sometimes appears is swelling of the penis and scrotum, which can be easily identified by the veterinarian.¹⁶³

The lungs can be mainly affected by two diseases: ulcer or inflammation of the lung (*qurḥat al-rīʿah*), and dyspnea or asthma (*al-rabū wa-ḍiq al-naḥas*). Both these diseases are characterized by a rasping cough, but in the former the coughing usually increases when the horse eats or drinks. According to Abū Bakr, this is due to the inflamed lung being irritated by particles of food that enter it and arouse the infected and purulent area. The purulent discharge that is emitted with the coughing is said to resemble fish scales. It is described as a severe disease, but the second disease of the lungs is even worse, because the coughing is accompanied by nose bleeding, snorting due to difficulty in breathing, and foaming at the mouth. This frightened the Mamluk doctors, who saw it as a sign of an incurable ailment.¹⁶⁴

¹⁶⁰ *Ibid.*, vol. II, pp. 83-85; al-Ṣāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 337; Anonymous, *al-Jawād al-ʿarabī*, p. 130.

¹⁶¹ Al-Ṣāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, pp. 336-337; Anonymous, *al-Jawād al-ʿarabī*, p. 130.

¹⁶² Al-Ṣāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 337; Anonymous, *al-Jawād al-ʿarabī*, p. 130.

¹⁶³ Al-Ṣāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 343.

¹⁶⁴ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 93.

The lungs were considered especially vulnerable to changes in the weather, hence the sources state that an illness that attacks animals in the spring, with symptoms similar to other respiratory problems caused by swallowing a bone, might result from problems originating in the lungs. The precise diagnosis in this case is based on general observation and examination of side effects such as coughing, general weakness, copious drinking of water, choking while drinking water, breathing difficulties leading to slow breathing and increased appetite. Sometimes the coughing intensifies and is accompanied by spitting out of a substance that looks like scar tissue. This indicates exacerbation of the disease, with an internal sore in the lung that may cause the horse to breathe through the mouth. The latter symptom contradicts a statement attributed to Ibn Sīnā that animals can breathe only through the nose, a characteristic that distinguishes them from humans.¹⁶⁵

The structure of Abū Bakr al-Bayṭār's treatise is of particular interest, since he organised his materials according to the different parts of the body, making it easier for the reader to use the book as a reference for diagnosis and treatment. He mentions six diseases that affect the horse's brain, describing their causes and the signs by which they can be diagnosed. These diseases are: (a) brain deterioration in winter,¹⁶⁶ (b) brain deterioration in summer (c) a disease called *ṣadām*, which he compares with a disease of humans called *birsām* (d) *ikhtilāj*—trembling of the body (e) severe headaches, *ṣudā'*, and (f) *māshir*. He writes that most of the symptoms indicating these diseases are external; therefore it is easy for the veterinarian to identify them. They include foaming at the mouth, or weeping, swelling in certain parts of the body, especially in the head and the eye sockets, and cloudiness of the eyes. Other signs to be taken into account are unnatural behaviour of the animal, such as trembling, headshaking, and inability to raise the head.¹⁶⁷

With regard to the liver, Abū Bakr al-Bayṭār lists seven diseases that might affect horses, describing the symptoms of each one. His diagnosis is

¹⁶⁵ See ʿĀdil al-Sayyid Aḥmad, *al-Islām wa-al-ṭibb al-bayṭarī*, p. 37 (the author does not state the source from which Ibn Sīnā is quoted).

¹⁶⁶ Abū Bakr writes that this disease has received little attention in his period and the animal doctors do not deal with diseases of this kind. This is explained by the fact that the veterinarians in his period focus on the practical aspects, whereas the theoretical explanations, including those based on the theory of the four humours, do not really interest them and do not serve as a basis for their practical work. See Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 149.

¹⁶⁷ *Ibid.*, vol. II, pp. 17-19.

based mostly on bodily secretions, as well as external signs relating to unusual behaviour of the horse. These signs include loud braying, excessive sweating, red eyes, fever, snorting, dry skin, loss of hair, nasal discharge, and diarrhea. Abū Bakr al-Bayṭār's precise description of each disease makes it easy for the veterinarian to identify which of the seven liver diseases the horse has contracted.¹⁶⁸

Returning to Abū Bakr al-Bayṭār, four diseases of the intestines are mentioned, and here, too, the diagnosis is based on unusual behaviour of the horse, such as banging its head against the wall. This behaviour, when accompanied by trembling of the whole body and loss of appetite to the extent of refusing to eat, indicates a disease called *taḥṭik*, which Abū Bakr al-Bayṭār describes as fatal. The other diseases of the intestines are also severe and most of them are almost incurable. Two of the most fatal diseases are called *taqṭīʿ* and *mughl* (colic?). The latter, says Abū Bakr, originates in the caecum (the "blind intestine"), and its diagnosis is based on criteria such as excessive sleeping and inability to stand up on awakening. Urine retention is another symptom of this disease, which Abū Bakr describes as extremely painful. On the other hand, he describes a very mild disease of the intestines called *qūlanj*, which he asserts is curable, explaining that it is usually caused by accumulation of air in the folds of the large intestine, which is also the source of its name (*gr. kólon*). Despite the sharp pains in the abdomen that cause the horse to sway from side to side, the excretion of faeces is not disrupted. The author emphasizes that this is the mildest of all the intestinal diseases and that the horse suffering from it will recover fully.¹⁶⁹

Of all the diseases affecting the internal organs, kidney diseases are the hardest to diagnose because these vital organs are responsible for the excretion of urine, which is defined in the veterinary sources as poison that has to be eliminated from the body. Whereas diseases of the digestive system are discussed in great detail in these sources, kidney diseases receive much less attention, and in fact we find only one diagnosis of a

¹⁶⁸ *Ibid.*, vol. II, pp. 87-89; According to al-Ṣāḥib Tāj al-Dīn the main symptoms of liver disease relate to the animal's behaviour, such as sniffing and turning over onto its side where it feels the pain, namely the right side, or more precisely, the right hip. In addition, there is inflammation of the oral cavity, the tongue becomes rougher and shows signs of inflammation, and when the animal is laid on its side it bends its body toward the painful right side, and one can discern swelling in the right hip. There may also be respiratory distress in this case. See al-Ṣāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 336.

¹⁶⁹ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 85-87, 353-357; On the signs of intestinal diseases, see al-Ṣāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, pp. 325, 329-330.

disease described as liable to affect the kidneys, without mention of its name. Among the symptoms that indicate kidney problems are difficulty in urinating, cloudy or bloody urine, urine that looks like “pastry water” (*mā’ al-‘ajīn*), or bright red urine that looks like water in which meat has been washed. The description of all these signs testifies to the writer’s understanding of the role of the kidneys in excreting urine from the body, but, this understanding did not help very much in the development of diagnostic methods for identifying such ailments.¹⁷⁰

6. *Diagnosis of Poisoning*

The causes of poisoning were many and varied, and in order to treat the animal properly it was important to determine the exact source of the poison. Identification of the sources of poisoning was a highly developed field in veterinary science, and most of the writers emphasize that correct diagnosis of the source is a guarantee of the cure and of saving the animal from certain death. It should be noted that the treatment of poisoning and expertise in types of poison were also highly developed in human medicine, as evidenced by the many treatises on the subject.¹⁷¹ Presumably the information in the veterinary sources on side effects of poisons was based mainly on the material in these treatises. Poisoning of animals was mostly caused by injury from other animals, such as snakes, scorpions, rats, ants, and bees, which left external signs that enabled the veterinarian to determine the type of poisoning and what animal caused it.

Most of the poisonings caused by bites or stings are classified in the veterinary sources as diseases that affect the surface of the skin, probably due to the assumption that every bite or sting by an external source inevitably leaves a visible sign. Bites or wounds inflicted by animals that might transmit diseases also appear in the category of poisoning. Among the animals mentioned as liable to attack and wound horses, for example, we find predatory animals such as lions, leopards, and wild boar. Bites of dogs

¹⁷⁰ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 93.

¹⁷¹ In his comprehensive book of doctors’ biographies, Ibn Abī Uṣaybi’ah also mentions the titles of their treatises, including some on the subject of poisons. For example, Ya’qūb Ibn Ishāq al-Kindī wrote two treatises: “*Risālah fī ashfiyāt al-sumūm wa-risālah fī idāh al-‘illah fī al-samā’im al-qātilah al-smā’iyah*” (*‘Uyūn al-anbā’*, p. 291); Yūḥannā Ibn Māsawayh wrote a treatise entitled “*Kitāb al-sumūm wa-ilājuhā*” (*‘Uyūn al-anbā’*, p. 255); Isā Ibn ‘Alī, “*Kitāb al-sumūm, maqālatān*” (*‘Uyūn al-anbā’*, p. 277), and in the biography of the Indian Mankah, Ibn Abī Uṣaybi’ah mentions the translation of Shānāq’s book of poisons from Indian to Persian during the period of Hārūn al-Rashīd. See Ibn Abī Uṣaybi’ah, *‘Uyūn al-anbā’*, p. 475.

and martens also cause wounds that were supposed to be treated as poisonous illnesses. The diagnosis of wounds caused by bites of such animals was difficult, unless their riders could identify the animal that had attacked and wounded their horse. The treatises also feature attempts to describe injuries by the depth of the wound and its shape, the quantity of bleeding, and other external signs that might identify the type of animal that inflicted them. For example, a leopard's bite causes the formation of a yellowish scar and the pus that accumulates during the coagulation and healing process is black or dark blue. The wild boar, an aggressive animal that is prone to biting, creates a deep wound because its canine teeth are very sharp, and it is not easy to stop the bleeding. The veterinary writers offer an interesting explanation of the transmission of poison from the body of the attacker to the attacked. They remark that wounds inflicted on a horse from the bite of a predatory animal, or caused by scratching with claws, may be highly dangerous and even fatal, due to the transmission of poison from the teeth or claws of the attacking animal. Some writers criticize those who rush to sew up the open wound, which may be highly dangerous and even cause the animal to die of poisoning, because sewing up the wound alone does not prevent the spread of poison in the body.¹⁷²

Rabies, the Arabic name of which derives from the word for dog—*marad al-kalab* ('dog's illness'), occupied a central place in the treatment of poisoning. The bite of a dog suffering from rabies was a serious problem for the veterinarian, who had to reach a quick diagnosis immediately after the bite and before the situation worsened. The swift timing was essential in order to establish whether the dog that had bitten the animal was, in fact, infected with rabies. What worried the veterinarians was not the wound caused by the bite but the possibility of rabies, which was apparently very common.¹⁷³ The fear of the disease being transmitted to humans added to the urgency of the diagnosis and the emphasis to expedite the treatment of animals bitten by dogs. A horse that was bitten by a rabid dog showed signs such as general weakness, shivering as if with cold, cloudy eyes, biting the bridle and the fodder bag and even biting the trainer or anyone trying to approach it. A veterinary treatise attributed to Wahab Ibn Munabbih adds to the verbal description listing details of all the signs of rabies a

¹⁷² Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 15. Treatments suggested in the veterinary sources in cases of bites or wounds caused by animals will be discussed in the section on methods of treatment in the next chapter.

¹⁷³ The treatment of rabies will be discussed in chapter VIII.

drawing depicting a horse sick with rabies.¹⁷⁴ The list of signs and symptoms includes stretching forward of the head, red eyes, drooping ears, an open mouth and drooping tongue, saliva dripping from the mouth and nostrils, the back caved in and the belly arched, the tail between the legs, dehydration, and even blindness. One author writes that if the veterinarian discerns all these symptoms it is best to destroy the infected animal.¹⁷⁵ Interestingly enough, some veterinary sources state that rabies may also result from an excess of black bile in the body. In this way they distinguish between a disease that an animal develops “independently” and one that is caught from another animal. They also mention the animals that are liable to contract this disease, among them the horse, the camel, and man, and, of course, the dog, adding that, in fact, any animal that is bitten by a dog with rabies is liable to contract the disease.¹⁷⁶

In the case of bites or stings of poisonous reptiles of all kinds, the main endeavour was to distinguish between two types of poisonous animals that were considered especially dangerous: snakes and scorpions. A snake’s bite might be fatal, whereas a scorpion’s sting is less severe. A snake bite is identified by external examination of the horse; the identifying signs are trembling of the whole body, swelling of the forelegs or hindlegs, swelling of the eyes and mouth, chattering of the teeth, loss of hair in the head and tail, and a very unpleasant odour from the body.¹⁷⁷ A scorpion sting has a different effect on the horse, and it is the veterinarian’s duty to search for the place of the sting and examine, in particular, whether it is swollen and hardened. These two signs generally indicate a scorpion’s sting. In this case, too, the horse begins to tremble all over, a thick fluid drips from his nose and he lies on the ground, unable to stand up, whimpering continuously in pain.¹⁷⁸

¹⁷⁴ See figures 34-35, showing a horse infected by a rabied dog.

¹⁷⁵ B.N., *Ms. Arabe 2817*, fols. 24v^o-25r^o.

¹⁷⁶ See, for example, B.N., Paris, *Ms. Arabe 2817*, fols. 41v^o-42r^o.

¹⁷⁷ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 17; al-Ṣāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 342. The anonymous author of a veterinary book from 757 H/1356 CE distinguishes between two types of snake bites, the first of which he calls by the Arabic word for snake—*ḥayyah*, and the second *afʿā*. Both types cause side effects similar to those described in the text except that after being bitten by a snake the horse defecates or scatters his stools. See Anonymous, *al-Jawād al-ʿarabī*, pp. 132-133.

¹⁷⁸ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 17; al-Ṣāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 340; Anonymous, *al-Jawād al-ʿarabī*, p. 132. Some sources do not distinguish between the two types of stings. Al-Malik al-Mujāhid, for example, describes the signs of snake bites and scorpion stings under the same heading, remarking that in both cases the injury causes severe swelling of the skin, reddening of the skin, difficulty in breathing, avoidance of eating

Discussing the bites of other animals, the veterinary sources state that the weasel (*ibn ʿirs*), may bite a horse and even injure it severely. In this case, the identification of the bite is by the swelling and hardening of the skin, accompanied by bleeding and secretion of a yellowish fluid. Other dangers to the horse's health are stings of wasps (*zanbūr*) and flies. In the latter case the veterinarians mainly have to examine those parts of the horse's body that flies prefer to sting, for example, the eye sockets, the anal area, the area around the nostrils and in the nose, *būz*.¹⁷⁹

Various objects can also cause poisoning and the sources refer to several methods of identifying them. This concerns mainly injuries of war horses from weapons such as arrows, spears and swords. In these cases the diagnosis is described in the veterinary sources as relatively easy, because the place where the weapon entered the body is visible.¹⁸⁰

Diagnosis was more difficult in cases of food poisoning, which was mainly incurred by eating poisonous weeds in open fields or weeds mistakenly mixed with the fodder. The veterinary sources warn of two particularly dangerous plants: the oleander, *diflā*, and the wild cabbage, *kurunb barrī*. The oleander's effect on the horse that eats it is described as extremely severe. The horse throws itself to the ground and begins to roll in the dust, sweating and foaming at the mouth. Its eyes become red, its tongue hangs out, it may bleed at the mouth and the horse begins to twitch in death throes within a short time of eating the plant. The second plant, wild cabbage, is said to be less dangerous and its effect is expressed in swelling of the whole body, drooping ears and swollen genitals.¹⁸¹ Another poisonous plant, *ḥalbūb*, mainly affects the horse's eyesight. According to the sources, this plant causes a disease called *bayād*, "white eye," which can lead to blindness if the horse does not receive the proper treatment.¹⁸²

The veterinary sources also discuss poisoning caused by eating hens' droppings, small animals, or insects such as spiders, which may be mixed with the hay in the horse's fodder. Certain liquids may also be toxic and endanger the horse's health, for example, milk drunk during the mating season, or a substance called *dhurrāḥ*.¹⁸³ These sources feature detailed

and drinking, excessive sweating, weakness leading to falling, but the sick animal can also stand on its feet. See Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 271.

¹⁷⁹ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 17.

¹⁸⁰ *Ibid.*, p. 15.

¹⁸¹ *Ibid.*, p. 97.

¹⁸² *Ibid.*, vol. II, p. 27.

¹⁸³ *Ibid.*, vol. II, p. 97.

descriptions of how to diagnose all these kinds of poisoning, caused by ingesting food, insects or drinks. Eating hens' droppings, for example, makes the horse very tired and apathetic (*buhtān*), it perspires copiously, behaves as if about to faint, and loses its appetite. In addition, its faeces look like egg whites, which is regarded as a reliable indication of poisoning from hens' droppings. Eating a spider causes the horse to snort loudly and produce grating sounds while breathing heavily, shaking its head violently and stamping on the ground with its forelegs and hindlegs.¹⁸⁴

A horse poisoned by swallowing *dhurrāḥ* (Spanish fly, blister beetle?), excretes bloody fluid from the anus, its abdomen swells and the horse begins to throw itself to the ground gasping for breath. Drinking buttermilk or milk called *laban al-ʿishār*, which is taken from a pregnant animal, causes the horse to discharge red foam from the mouth, bleed from the nostrils and the penis. This milk, according to the sources, is deadly poison and no animal that drinks it will survive.¹⁸⁵

It appears that the veterinarians were familiar with many kinds of poisonous plants that are also mentioned in various pharmacy treatises, which mainly served the pharmacists in dispensing medicines and potions. These plants could be fatal both to humans and animals if taken without supervision. Some veterinary writers point out that an animal is more likely than a human to eat poisonous weeds while out in the open or in the pasture. They also attempt to provide descriptions as detailed as possible in order to help in the precise identification of a poisonous plant and prescribe the most effective treatment for dealing with its effect. Of all the animals, camels were the most vulnerable to poisonous plants. The Yemenite author al-Malik al-Ashraf lists the kinds of weeds that are especially poisonous to camels, relating mainly to those types that were familiar to him in the area of Yemen and the south of the Arabian Peninsula. In particular, he warns camel owners to beware of a plant called *al-ʿatīb*, noting that an animal poisoned by it cannot be cured completely.¹⁸⁶ Other plants that he mentions are *al-anāb*, described as harmful but not fatal, and *khazar al-qibab*. However, he does not describe the external signs by which to identify their effect. In contrast, in describing a disease of camels called *al-ḥarīr*, one of whose signs is high fever, the author remarks that it is caused by eating a

¹⁸⁴ Al-Ṣāḥib Tāj al-Dīn calls this insect *khishkhish*, and remarks that it is similar to a spider. See al-Ṣāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 340; Anonymous, *al-Jawād al-ʿarabī*, p. 132; Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 97.

¹⁸⁵ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 97.

¹⁸⁶ Al-Malik al-Ashraf, *al-Mughnī*, p. 174.

tree unknown to him. Yet apart from high fever, no other bodily symptoms are mentioned. He even expresses his doubt concerning the attribution of what he refers to as “internal fever” to the eating of an unknown plant, adding that it may be caused by some act of God.¹⁸⁷ Ignoring the cause of the poisoning and being unable to identify it, the author does not exclude the possibility of divine intervention. Such a religious explanation of ailments is uncommon in veterinary treatises from the Mamluk period.

¹⁸⁷ *Ibid.*

CHAPTER SEVEN

NON-INVASIVE PRACTISES IN VETERINARY TREATMENT

A. MEDICINES AND OINTMENTS

Medicines and ointments were the major elements recommended by veterinarians for the treatment of animals' illnesses. Some of the veterinary sources distinguish clearly between medicines used for animals and for humans, mainly due to the basic view that animals were creatures with a 'single temperament' according to the medical theory of the humours. Besides, it was assumed that "the thickness or density of the organs in the animal's body is greater than in the human body."¹ This view required veterinarians, like doctors of humans, to identify the temperament of every animal, whether it was a large animal with thick, hard bones, such as a horse, a mule, a donkey, a camel, or an elephant, or a small animal such as a bird. And this identification of the temperament largely determined the nature of the medicine for each animal, taking into account the kind of disease to be treated. The medical theory also required the veterinarian to know and anticipate the effect of every illness on the body, especially the changes that it might cause in the animal's temperament, and to decide accordingly what medicine would suit the temperament of the disease. Thus, if the disease made the patient dry instead of moist, the appropriate treatment would be a medicine with a moist temperament, and for a disease that made the body hot the medicine recommended would have a cold temperament and would work by cooling the body. Despite the distinction between human and veterinary medicine, it is easy to find in the sources many parallels in the medicines and ointments used for treating animals and humans, especially when the diseases diagnosed were identical or similar.

Medicines were administered to animals in many different ways, including:

¹ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 93.

1. Orally—in the case of animals who would take the medicine without resisting, without any need to use special measures to administer the drug.²
2. Force feeding—if the animal resisted taking the drug. The veterinary sources describe methods using implements such as a tube or a horn inserted into the throat after forcing the mouth open with an instrument resembling a small ladder or horn, in order to prevent the animal from closing its mouth while the drug was being introduced.³
3. Administering aromatic substances or nose drops made of substances such as incense, oils, and perfumes, rubbed on the nostrils so that the animal would smell them while breathing.
4. Introduction of medications through the rectum, mostly in the form of suppositories or enemas, but sometimes the substance was inserted manually into the anus.⁴
5. Spreading lotions on the surface of the skin or on external wounds and cuts.⁵

In the case of an open wound caused by an external event or a cut made by a veterinarian for treatment purposes, they used various medications such as lotions and mixtures spread on the open blood vessels. The medieval veterinarians clearly did not possess adequate knowledge concerning the injection of medications into the blood vessels as is practised today. The main medical use of the circulatory system was for bloodletting, and there is no mention in the veterinary sources of any treatment involving the introduction of medical substances into the bloodstream. At the same time, it was clear that medication placed on an open wound or an exposed blood vessel would be absorbed into the bloodstream, even if the existence of the latter was not yet fully ascertained.⁶ Such treatments were used in the case of an open wound when a major vein or artery of a hunting or riding animal was cut as a result of an attack by a wild animal such as a lion, leopard, or wild boar. In these cases, the veterinary writers advise the use of coagulants, which were a mandatory ‘first-aid kit’ for those going out on a hunt. One recommendation involves taking a new coarse sponge (apparently a sea sponge that was in pharmacological use) and soaking it

² See figure 36.

³ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p.189. See figure 37.

⁴ See figures 38-39.

⁵ See figure 40.

⁶ Ullmann, *Islamic Medicine*, pp. 64-69.

in oil, and then burning it and using the ash as a powder to stop the bleeding, spreading it over the artery or vein and binding it lightly.⁷

Abū Bakr al-Bayṭār, in the penultimate chapter of his book *Kāshifhamm al-wayl* describes in detail the preparation of the various mixtures, drenches, jellies, potions, lotions, drops, enemas, suppositories, bandages, and more, adding a thorough description of each medication and an explanation of its use, along with a description of the disease or medical problem that it is designed to cure.⁸ The theoretical basis for the use of medicines defined as 'simple' is explained by writers of hippiatry treatises as the simple fact that animals have larger bodies than humans and their nature is stronger and more intense, hence they need to be treated with stronger medicines, belonging to the category of 'simple medicines' (*al-adwīyah al-mufradah*). In contrast, the medicines used for treating humans are defined as 'complex'⁹ on the assumption that the human temperament is softer and more delicate, and therefore illnesses of humans need to be treated with medications of a delicate temperament. The veterinary sources cite numerous examples of the use of simple medications as opposed to complex ones, and these examples include almost every type of medication that was used for treating animals.

Medications that played a major part in the treatment of animals were divided into categories according to their effect on the patient's body and

⁷ Anonymus, *al-Jawād al-'arabī*, p. 278.

⁸ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 389-417.

⁹ 'Simple' medicines were also used for treating humans. The various compounds that were produced from the 'simple' medicines were used to prepare the 'complex' medicines. Ibn Sīnā devotes an entire chapter to the 'simple medicines' in which he discusses their temperament, the testing of their effectiveness by trial and error, changes that might affect their nature, methods of choosing and gathering them, as well as a long alphabetized list of medicines belonging to this category. The term 'simple' means that they consisted of only one kind of substance. The most widely used medicines were made from plants, using roots, leaves, flowers, branches and resin. Treatises from the Ayyubid and Mamluk period, such as those of Cohen al-'Aṭṭār and Ibn al-Bayṭār, devoted entire chapters to the optimal times for collecting plants for preparing medicines, the best places for collecting the plants, the method of preservation and the substances and dishes used for every one of the 'simple' medicines, the time span for using the medicine before it becomes ineffective or harmful. Certain medicines could be used for twenty years or more and others were good for only six months to a year. See Ibn Sīnā, *al-Qānūn fī al-ṭibb*, vol. I, part 2, pp. 365-366; Abū al-Muná Dā'ūd Abī al-Naṣr al-'Aṭṭār al-Hārūnī known as Cohen al-'Aṭṭār, *Minhāj al-dukkān wa-dustūr al-a'yān fī a'māl wa-tarākīb al-adwīyah al-nāfi'ah li-al-'abdān*, ed. Ḥasan 'Aṣī, Beirut: Dār al-Manāhil, 1992, pp. 273-279; Ḍiyyā' al-Dīn Abī Muḥammad 'Abd-Allah b. Aḥmad Ibn al-Bayṭār al-Andalusī al-Māliqī, *al-Jāmi' li-mufradāt al-adwīyah wa-al-aghdhīyah*, 4 parts in 2 vols., Beirut: Dār al-Kutub al-'Ilmiyah, 1992, *passim*.

also according to the method of administration. The veterinary sources refer to six categories of medications.¹⁰

1. *Laxatives and Anti-Diarrhea Medication*

Laxatives that were effective in human medicine were based on cooked fruits and parts of plants, among them agaric—‘*ghārīqūn*’,¹¹ rhubarb (*Rheum* sp.)—‘*rāwand*’,¹² violet flowers, and more.¹³ These medicines, based on plants growing freely in nature, were not considered suitable for veterinary use, and veterinarians treating constipation in horses used purgatives that were stronger and more effective, such as the ‘*bashūsh*’ plant,¹⁴ the *ṣubbār* (Indian fig)—‘*ṣabr*’,¹⁵ oil extracted from the colocynth—

¹⁰ The list of medications in Abū Bakr’s book is divided into 12 categories. In this classification he places special emphasis on the manner and purpose of using them for treating different diseases: 1. kohl, creams and powders for the eyes; 2. laxatives; 3. drugs to stop diarrhea; 4. ointments; 5. warm compresses (fomentation, lavation or bath in medicated liquid)—‘*nuṭūlāt*’; 6. lotions to rub on the body; 7. cauterization; 8. adhesive bandages; 9. powders; 10. enemas; 11. plaster bandages for immobilizing and setting bones; 12. charms and whispers. See: Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 389-417.

¹¹ A sweet tasting root, used for cleansing the stomach and for many other problems connected with surplus of humours. It was effective for treating urine retention and problems caused by accumulation of yellow bile and phlegm, and particularly for relief of stomach pains. See: Ibn al-Bayṭār, *al-Jāmi’ li-mufradāt al-adwīyah*, vol. II, part 3, pp. 199-201. See also Oliver Kahl, *The Dispensatory of Ibn al-Tilmid: Arabic text, English translation, study and glossaries*, Leiden-Boston: Brill, 2007, p. 325 [Index of technical terms].

¹² Cohen al-‘Aṭṭār (al-Hārūnī) describes the preparation of a drink called ‘*rāwand*’ (that contains 20 *dirham* of the plant rhubarb (*rāwand*), steeped in 3 rotl- ‘*raṭl*’ of water for 24 hours and then boiled on a low flame with 3 *raṭl* of *ṭabarzad* sugar. Most of the potions prepared by boiling fruit and plants with sugared water were used for digestive problems. According to the writer, *rāwand* was effective for opening ‘blockages’ and strengthening the liver. Al-‘Aṭṭār al-Hārūnī, *Minhāj al-dukkān*, p. 34.

¹³ Violets were widely used, including all their parts: stalks, leaves, and mainly the flowers, from which oil was extracted for many purposes. The leaves served for preparation of various medications, such as creams for treating inflamed eyes. The flowers were used to prepare a drink that was considered effective for curing illnesses that affected children such as epilepsy. An aperient was made from sugar mixed with various syrups prepared from pears, grapes and tamarind. It was also effective for treating urine retention and kidney problems, as well as headaches caused by accumulation of yellow bile. Oils extracted from violets were widely used as cosmetics for the skin and as perfume. See al-‘Aṭṭār al-Hārūnī, *Minhāj al-dukkān*, p. 164; Ibn al-Bayṭār, *al-Jāmi’ li-mufradāt al-adwīyah*, vol. I, pp. 156-157.

¹⁴ A plant called ‘*bashūsh*’ appears in Ibn al-Bayṭār’s book under the name of *bashūsh* and is explained as the leaves of the colocynth. See Ibn al-Bayṭār, *al-Jāmi’ li-mufradāt al-adwīyah*, vol. I, part 1, p. 132. See also note 16 below.

¹⁵ According to Ibn al-Bayṭār, the aloe (*ṣabr*) served, among other things, for healing wounds, treating inflammation of the nose and eyes, and for hemorrhoids. But its main use was in the preparation of a purgative for cleaning the stomach. It was also considered effective for treating problems caused by black bile (melancholia). The many medications

'*ḥanẓal*'¹⁶ and others,¹⁷ which were classified as 'separate' medications. The veterinary sources also feature explanations of the use of plant or mineral-based medicines to stop diarrhea in animals.¹⁸

2. Eye Medications

To this day eye illnesses are hard to cure because the eye is one of the most sensitive organs in the body. Muslim writers on the scholastic medicine of the Middle Ages devoted separate treatises to eyes. This attests to the importance that they attributed to the eye and the high level of skill required of eye doctors, who even bore a special professional title: *Kaḥḥāl*.¹⁹ In veterinary medicine there do not appear to be any extant separate treatises on the treatment of animals' eye conditions, and perhaps none such were written. Nevertheless, the care of animals' eyes was a major aspect of the veterinarian's work, and one that required great skill, which indicates an advanced level of knowledge in the field.

The medical sources refer mostly to two medications for treating eye conditions in humans, both fine powders, called kohl and '*dhurūrāt*'. These powders were applied to the eyes by means of an instrument called

prepared from this plant included lotions, smelling substances, and potions. *Ibid.*, vol. II, part 3, pp. 104-108.

¹⁶ *Hanẓal*—the colocynth, also known in English as bitter apple, is a plant that spreads on the ground and bears round, very bitter fruit. Its bitterness features in an Arabic proverb—"bitterer than the *ḥanẓal*"—referring to something that is really bad. Its main use was as a purgative, sweetened with honey or sugar. It was also used as a medicine for illnesses caused by black bile, such as melancholia, epilepsy—'*ṣara*', a mental illness known as '*wiswās*', and also for skin diseases. The root of this plant was used as an antidote to poisoning from snake bites. When boiled with oil it was used to make ear drops, a medicine for relieving toothache and facilitating tooth extraction. A preparation made from *ḥanẓal* also served for extermination of fleas. Another use of the colocynth fruit was as a dye for gray hair and even for delaying the graying process. See *Ibid.*, vol. I, part 2, pp. 296-298.

¹⁷ Abū Bakr states that he learnt from his father that the best purgative for horses is *bashūsh*, explaining that *bashūsh* is in fact *ḥanẓal* leaves. The recommended dose for a horse is 4 *dirham* mixed with one *raṭl* of hot water. He discusses the differences between purgatives used in different regions, remarking that in Syria they use one ounce of the sabra plant, crushed and mixed with warm water or honey. See Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 395.

¹⁸ In this case, too, Abū Bakr refers to a prescription of his father's, composed of green sycamore leaves, the '*al-'adhbah al-kuzbarīyah*', unripe grapes, Cypriot clay, amber—'*kahrubā*', gum-senegal—'*qāqyā*', tabasheer—'*tabāshūr*', '*riḥlah*' seeds (*graine de pourpier*), pomegranate flower—'*julunnār*', sumach—'*summāq*', white sandalwood—'*ṣandal abyāḍ*', and more. See *ibid.*, p. 395. On Cypriot clay, see E. Lev and Z. Amar, *The Practical Materia Medica of the Cairo Genizah*, Leiden: Brill, 2007, p. 149.

¹⁹ The various branches of medicine are discussed in chapter III, which also features an explanation of eye doctors.

makhlah, with which the practitioner drew a line around the eyes and on the eyelashes. As well as these two, there was another substance, called *ashyāf* (eye-slave), similar to kohl but with a higher concentration of minerals. *Ashyāf* was more complicated to prepare and could be kept for a long time.²⁰ As with eye treatment in humans, the veterinarians used medications based on kohl and expensive substances such as *aqlīmyā* powders, gold, silver, pearl powder, *dahanj* and *‘arīr* (*‘ar‘ar*—*narjis barri*).²¹ Besides powdered pearl, silver, and other minerals and plants, the falconry books also refer often to the use of animals' blood, when the blood of a newly slaughtered animal was dropped straight into the eye of a sick bird. It is worth noting that such remedies, based on drops of animal blood, originated from al-Ghiṭrīf's treatise, which was the earliest source of Arabic falconry literature. Milk taken from a feeding mother also appears in the list of effective treatments for eye problems.²² The more intricate prescriptions with a richer chemical or botanical composition were the direct result of the Islamic pharmacological development during and just before the Mamluk period.

As well as all the precious powders used by veterinarians for treating eye conditions, we find other components which are described in the

²⁰ The pharmacist Cohen al-‘Aṭṭār al-Hārūnī remarks that powders like kohl can be used for up to a year after preparation, but the *‘ashyāf* type can be used for a much longer period because it includes a higher concentration of minerals and its preparation is more meticulous; hence it does not become oxidized quickly and it can keep for a long time. Al-‘Aṭṭār al-Hārūnī, *Minhāj al-dukkān*, p. 276.

²¹ *Al-Dahanj* is a precious stone, chrysolite—*‘zabarjad* (emerald) green in colour, but of varying shades according to the composition of the soil in which it is formed. It is a fairly soft stone and can be ground into powder, and it was also used as an antidote to poison, or as a cream to rub on a scorpion sting. For a person adversely affected by black bile, as in the case of epilepsy, *dahanj* was steamed and given to the patient to smell three times a day. Ibn al-Bayṭār, *al-Jāmi‘ li-mufradāt al-adwiyah*, vol. I, part 2, pp. 405-406. For comparison of eye treatments for falcons, see al-Ghiṭrīf, *Kitāb Dawārī al-ṭayr*, pp. 82-83; al-Baladī, *al-Kāfi fi al-bayzarah*, pp. 249-253.

²² Cohen al-‘Aṭṭār devotes a chapter to the preparation of kohl, which he describes as particularly effective for problems of sight, weakness of the eyes, cataract, albugo- *‘bayāḍ al-‘ayn*’ or *‘al-bayāḍ al-aṭīq*’, skin diseases, itching eyes, and many other eye diseases. He describes a kohl called *‘rūshnāyā*’, prepared from several precious substances such as silver, *aqlīmyā al-faḍḍah* or *aqlīmyā al-dhahab*—(slag, auric), and also copper powder, Indian salt, ginger, white pepper, black pepper, and more. Another kohl, called ‘the greatest Basilicon’, collyrium—*‘al-bāsiliqūn al-akbar*’, contained substances such as *aqlīmyā* of silver. Many types of kohl were prepared from a mixture of precious materials including, gold powder, silver powder, and pearl powder. All these metallic ingredients were also used in veterinary medicine for treating eye problems. See Cohen Al-‘Aṭṭār al-Hārūnī, *Minhāj al-dukkān*, pp. 135-142; Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 391; Kahle, *The Dispensatory of Ibn al-Tilmīḍ*, p. 326.

sources as being highly effective for this purpose, including mainly salts such as *andarānī*,²³ *naṭrūn*,²⁴ sal ammoniac—*nūshādir*,²⁵ pepper,²⁶ and more.²⁷ Animal organs were also used in the preparation of mixtures and creams for eye treatment. Among these we find lizards,²⁸ bats (*waṭwāṭ* and *khaffāsh*),²⁹ scorpion ashes, shells of ostrich eggs, dog's liver, hoopoe's blood, she-ass's milk, milk of a breastfeeding woman, and more.³⁰ Ashes

²³ Many kinds of salts were used in medications in the Middle Ages. Some of these were extracted from various stones, and others obtained from the sea and imported to the territories of the Mamluk Empire, mostly from Cyprus and Sicily. Ibn al-Bayṭār, for example, mentions the Dead Sea as a source of salt. The salt called *andarānī* was used for many medical purposes, as a purgative, an antidote to poison, a cure for earache, and a stimulant to the appetite. Mixed with honey and flour, it was used for relieving stretched muscles. It was also good for abscesses and helped to eliminate black bile and phlegm from the body. But the principal use of *andarānī* salt was for eye treatment. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. II, part 4, pp. 455-458.

²⁴ Natron—*Naṭrūn* is a form of borax—*'bawraq'*, which is a general name for many types of minerals. See *Ibid.*, vol. I, part 1, pp. 170-173. On borax, see below, Chapter VIII, n. 140.

²⁵ There are two types of salt called *nūshādir* (ammonia?), one natural (*ṭabī'ī*) and obtained from hot springs, the best of which is in Khurāsān, and the other "artificial" (*sinā'ī*). This salt was used for preparing medications for eyes and for other problems. Its effect was to draw the illness out of the body. It was also used for household purposes, for example, it was mixed with water and sprayed around the house to repel scorpions and snakes, and to disinfect bath-houses. See *Ibid.*, vol. II, part 4, p. 485.

²⁶ According to Ibn al-Bayṭār, both black pepper—*fulful aswad*, and white pepper—*fulful abyad*, were used for medicinal purposes. White pepper was used especially in the preparation of kohl for treating eye problems. Pepper was also used in remedies for digestive problems, toothache, and muscle problems. Women also used it to prevent conception after sexual intercourse, to enhance sexual desire, and for many other purposes. See *Ibid.*, vol. II, part 3, pp. 227-229.

²⁷ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 391-393.

²⁸ *Hardūn*, a lizard of the agama family, served in the preparation of many medications. The belief in the properties of this animal was so great that its parts were used for treating all kinds of illnesses in various manners, such as hanging its heart on a person with fever, or spreading its skin on the body to prevent pain from blows or from amputation. The lizard's excrement was also used as a cosmetic by women, who spread it on their faces to make the skin glow. Ibn al-Bayṭār remarks that many merchants sold fake imitations of this product. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. I, part 2, p. 272.

²⁹ The bat—*waṭwāṭ*, or *khaffāsh*—was used for its blood, which was spread on intimate areas of the body to prevent the growth of hair among young people. It was also boiled to produce a remedy for a muscle problem called "*irq al-nasā*"—sciatica (*med.*). Bat's bile was rubbed on the vulva of a woman in labor in order to ease the birth. In men, when rubbed on the penis it helped to cure urine retention, and when spread on young girls' breasts it prevented them from growing too large. To make kohl for the eyes, a bat's head was burned and the ash was ground to a powder. It was also used to repel mice or cause pigeons to return to their cotes. Bat's brain rubbed on the feet had an aphrodisiac effect. See *Ibid.*, pp. 335-336.

³⁰ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 391-393; al-Baladī, *al-Kāfi al-bayzarah*, pp. 249-252.

of tamarisk—*tarfā*—were also considered effective for treating eye diseases.³¹

3. Orthopedic Bandages (for Setting Broken Bones)

To heal broken bones in horses or similar large animals the veterinarians used remedies stronger than those used for humans. The veterinary sources mention several substances that were suitable for treating large animals, particularly in the case of orthopedic problems such as fractures, sprains, dislocation, and displacement of bones.³² A broken leg could be a death sentence for a horse or other large animal, and the treatment of broken bones was a field in which the Mamluk veterinarians reached heights of achievement. The materials used for treating fractures in humans included Armenian bole,³³ dragon's blood—*dam al-akhawayn*,³⁴ vetch flour or powder—*kirsinnah*,³⁵ tamarind seeds and gum—

³¹ Tarfa—'Tarfā', a tree that grows near water sources and is widespread in Syria and Egypt, was used in the preparation of numerous medications. The leaves, when boiled, were used for the treatment of diseases of the spleen and for toothache, but the main use of this tree was burning it to make kohl for eye treatment, for infection in the mouth, and for menstrual problems. The dust of the ashes was used for drying purulent wounds. Vapor from the burning tree was used to expel parasites from the oral cavity and the throat, and also external body parasites such as lice and fleas. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwīyah*, vol. II, part 3, pp. 133-134.

³² Abū Bakr provides instructions for preparing a splint for broken bones, claiming that it is also suitable for humans. The ingredients include Armenian bole—'īn Armani', pollen of the vetch flower—'ḥaṣā al-bān' (ben?), and roasted tamarind kernels. These ingredients are kneaded into uniform dough with the addition of egg whites. See Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 409.

³³ A quick-drying paste to bind the broken limb was prepared from Armenian bole and some other adhesive substances. Cohen al-'Aṭṭār cites an example of substances used to prepare the paste for binding and immobilizing the broken bone. This paste was good both for fractures and for sprains. The ingredients were *maghāth*—20 dirhams, Armenian bole—20 dirhams, myrrh—10 dirhams, *khuṭmī* flour—10 dirhams, and *aqāqarīb*—5 dirhams, all ground together and kneaded with egg whites. See Al-'Aṭṭār al-Hārūnī, *Minhāj al-dukkān*, p. 200. On Armenian bole and its many medical uses in that period, see Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwīyah*, vol. II, part 3, pp. 151-152.

³⁴ Dragon's blood—*dam al-akhawayn*, also known as *dam al-tannīn*, *dam al-thu'bān*, or *ayda*, is a resin from a tree that was used to treat wounds and deep cuts, including sword cuts, and was also good for instantly stopping copious bleeding. Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwīyah*, vol. I, part 2, p. 377.

³⁵ *Kirsinnah*—vetch—is a bush with fine leaves. Its fruit was used for many medicinal purposes, mainly when ground to a powder. *Kirsinnah* was (and still is) widely used for animal fodder and when cooked it was excellent for fattening animals such as cows; it was also used to fatten hens. In the treatment of humans it was found effective as a diuretic, a laxative, for cleaning the blood, cleansing wounds, treating breast tumours, lung infections, snake bites and scorpion stings, and even for bites inflicted by humans. To prepare *Kirsinnah*

qāqyā.³⁶ Although all these substances were known for the characteristic of drying quickly and were used for setting broken bones of humans and falcons.³⁷ Stronger and more effective substances were needed for horses, because the period of immobilization had to be shorter for these animals due to their lack of patience and the difficulty of keeping a close watch on them. The materials defined as suitable for treating horses included resin obtained from the Boswellia plant (olibanum)—*lubān*,³⁸ as an alternative to Armenian bole, *kundur*, another species of Boswellia³⁹ and a good substitute for *qāqyā*, with the addition of a little *zift*.⁴⁰ An adhesive prepared

powder, the fruit was soaked in water for a long time until it absorbed all the water, and then it was grilled until the peel opened. The fruit was then peeled, mashed, sifted, and preserved for medical use. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. II, part 4, p. 323.

³⁶ Gum-senegal—*Qāqyā*, or *qirz* was the name of a thorny plant See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. II, p. 243. Ibn al-Bayṭār refers to *Qāqyā* spread with Armenian bole as an effective treatment for immobilizing broken bones. See *Ibid.*, vol. II, part 3, p. 152.

³⁷ See, for example, al-Baladī, *al-Kāfi fi al-bayzarah*, pp. 321-322.

³⁸ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 409 [*lubān*], p. 405 [*kundur*]. Ibn al-Bayṭār states that *lubān* (olibanum) is the *kundur* (frankincense) that is described as a substitute for *qāqiyā*—(gum-senegal). See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. II, part 4, p. 374 [*lubān*], and pp. 348-352 [*kundur*]. Although Abū Bakr refers to *kundur* and *lubān* as two different substances that served as alternatives to those used in human medicine, it may be that they were resin or glue from two different plants. Clearly, they had similar qualities and they both served mainly as adhesive material for immobilizing broken bones.

³⁹ According to Ibn Samḥūn, as quoted in the pharmacological work of Ibn al-Bayṭār, *kundur* is the Persian name for *lubān 'arabī*, which is a kind of resin with adhesive qualities. Apparently it originated from the mountainous regions of Yemen, where it grew as a thorny bush. Another species mentioned by Ibn al-Bayṭār originated from India. *Kundur* was believed to be effective in drying and healing wounds, therefore it was mainly used for treating burns, cuts and deep wounds, and for staunching bleeding. As a medicine to be drunk it was used to treat problems that stemmed from excessive phlegm, such as heart disease and memory loss. The peel of the fruit was used for preparing medications for treating inflammation of the bowels and severe stomach problems, and for chronic uterine inflammation. It is worth noting that despite all its medical properties described in the pharmacological literature, *kundur* is not mentioned there as a substance that can serve in the treatment of fractures, while the veterinary writers refer to it as being particularly effective for broken bones and stronger than *qāqiyā*, which was used for treating broken bones in humans. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. II, part 4, pp. 351-352.

⁴⁰ Pitch—*zift*, which was collected from the cedar and *tanūb* trees, was apparently a resin. It was used for many purposes in human medicine, particularly as one of the ingredients in complex medicines. Mixed with honey it was good for lung problems such as pneumonia, coughs, etc. Combined with *kundur* it was used to treat old wounds that were slow to heal. There are moist and dry varieties of *zift*, and both were used for medical purposes. *Zift* was also used to prepare kohl for treating problems of eyes and eyelashes. Pharmacology books mention the use of moist *zift* mixed with a substance called *qasālāwūn*

from the star of Bethlehem flower, asphodel—*ashrās*,⁴¹ was another good veterinary substitute for the powder obtained from vetch (*kirsannah*) seeds. Some of the veterinary sources provide detailed explanations of substances that were in veterinary use, stating in each case which product in human medicine they substituted for. These explanations illustrate the differences that existed between human and animal medicine in the therapeutic and pharmacological context in general, and in the treatment of fractures in particular, and this is most salient in light of the special needs of horses.

4. Creams and Powders

The application of healing, soothing, and cosmetic creams to the body has been a common practise in human medicine since ancient times. Muslim medicine placed considerable emphasis on cosmetic needs, and most of the general medical sources include a special chapter on this subject. For massaging the body they often used henna oil and oils extracted from fragrant flowers such as violets, narcissi, and roses.⁴² In veterinary medicine, too, there was often a need to massage animals' bodies, and for this they used substances such as *saljam* oil,⁴³ old oil [*samn qadīm*], and also a kind of paste made from the bone marrow of a donkey's leg.⁴⁴

In the veterinary books the creams are divided according to their use. Abū Bakr, in a category of creams which he calls *marāhim*, lists several remedies for treating wounds of animals and humans. Most of the creams were used for purulent sores, burns, and various tumours.⁴⁵ One type, called *nuṭūlāt*, served mainly for growths and swellings on the skin. Creams called *luṭūkhāt*, prepared for bandaging purposes, were also used for treating skin growths on various parts of the body such as the legs, the back, and the

as highly effective for treating skin infections and eczema in animals. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwīyah*, vol. I, part 2, pp. 470-471.

⁴¹ Asphodel—*ashrās*, a resin obtained from the star of Bethlehem (ornithogalum), could be preserved and then mixed with water prior to use. It was very effective for immobilizing broken bones and was also used in bookbinding. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwīyah*, vol. I, part 1, pp. 51-52.

⁴² Cohen al-ʿAṭṭār's pharmacology book contains many recipes for oils to be used for treating various ailments, from stomach ache, through problems with joints, to impotence. He also discusses the kinds of oils and incense that were used in the Cairo hospital. See al-ʿAṭṭār al-Hārūnī, *Minhāj al-dukkān*, pp. 161-171.

⁴³ *Saljam*—a kind of turnip (*Brassica rapa*; *bot.*) [Or rape (*Brassica napus*; *bot.*)]. See al-ʿAṭṭār al-Hārūnī, *Minhāj al-dukkān*, p. 240.

⁴⁴ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 251.

⁴⁵ *Ibid.*, p. 397.

abdomen.⁴⁶ Another kind of cream was *lazqah*, meaning cream spread on strips of cloth for sticking to the body like adhesive plaster. This usually contained various adhesive materials (*lazqāt*) such as pine resin, gum Arabic, and resin from the “star of Bethlehem” (*ashrās*)—asphodel. All of these were important components of adhesive bandages, which were mainly used for immobilizing broken or dislocated bones, sprains, and so forth, and also for the treatment of tumours.⁴⁷

A healing lotion called *nuṭūlāt* was used for treating animals' skin problems, particularly as an alleviant for burns (for which it was also used in human medicine). Many healing lotions were prepared on a plant base such as melilot—*iklīl al-malik*,⁴⁸ chamomile,⁴⁹ water mint,⁵⁰ wild rue

⁴⁶ *Ibid.*, p. 399.

⁴⁷ *Ibid.*, p. 403.

⁴⁸ This plant was useful for treating various infections—of the eyes, uterus, rump, anus, scrotum, and ears. Pharmacists used a liquid extract from the plant to treat severe headaches (*ṣadā*), as well as inflammation of the spleen, liver and intestines. Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwīyah*, vol. I, part 1, pp. 68-69.

⁴⁹ Chamomile (*bābūnaj*) was used for a broad range of medical treatments. It is known by different names in different countries; for example, in Islamic-Spain it is called *mqārjah*, and in North Africa *rijl al-dajājah*—‘hen's foot’. Chamomile belonged to the category of separate medicines and had characteristics similar to roses. Among its many uses, the plant was boiled in water with all its parts, stems, leaves and flowers, and women experiencing menstrual pains or labor pains sat in a bowl full of this water to relieve the pain or facilitate a smooth delivery. This remedy was also effective for kidney stones. As a drink it was good for strengthening the body, treating headaches caused by colds, pneumonia, urinary problems and for cleansing the body. As a cream to be applied to the skin it was good for muscle pains and also for internal pains. Its vapour was effective for treating colds and preventing deafness. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwīyah*, vol. I, part 1, pp. 101-103.

⁵⁰ Mint—*na'na'*—is known for its many medical qualities. Its uses described in pharmacology books include mixing it with vinegar to eradicate worms from the body, enhance male potency and stimulate sexual desire. The external uses include applying a bandage containing mint to the forehead and head to relieve severe headaches, and a mint and salt dressing for dog bites. Chewing mint leaves was recommended for the relief of toothache and painful gums and for assuaging the pain of scorpion stings. Mint ear drops were used to treat ear infections, and for swollen breasts due to congealed milk a poultice of mint leaves could be applied. The same poultice was effective for treating hemorrhoids. A preparation containing mint ground with raisins was applied to swollen testicles to reduce the swelling and relieve the pain. Mint was also used as a contraceptive device in the form of a suppository to be inserted into the woman's vagina before intercourse. Mint was regarded as an excellent addition to all kinds of medications for heart diseases and highly effective for the relief of pain. Mixed with vinegar, it was used to prepare a palliative for the bowels and stomach, and also as a stimulant to the appetite. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwīyah*, vol. II, part 4, pp. 479-481.

(*harmalah*)—*ḥarmal*,⁵¹ common rue—*sadhāb*,⁵² chaff—*nukhālah*,⁵³ *barnūf*⁵⁴ and more.⁵⁵

Contrary to the declarations of many veterinary writers that they used 'simple' substances for animals, we often find the use of quite complex medicines. The preparation of creams for animals was not always an easy matter and sometimes we find a medication whose preparation required not only skill and a high level of pharmacological knowledge but also a broad range of components. For example, al-Ṣāhib Tāj al-Dīn's book contains a prescription that includes over thirty different ingredients that, according to the writer, could be stored and used for a long period. He writes that he himself used this preparation to treat a condition called *'iqāl*, which is caused by the animal straining one of its thigh muscles.⁵⁶ Al-Ṣāhib

⁵¹ Harmala (*ḥarmal*)—wild rue/African rue (*Peganum harmala* L.; *bot.*), an odorous plant with red or white flowers, was widely used in the Middle Ages for preparing purgatives and also for treating epileptics. The medicine was made from the fruit, which had an inebriating effect and even caused vomiting; therefore it had to be thoroughly washed, minced and cooked prior to its use as a medicine. A woman who failed to conceive again after her first pregnancy could take this medicine for three days, and if she vomited it was a sign that she would become pregnant again. It was also used as an aphrodisiac. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. I, part 2, pp. 266-268; Oliver Kahl, *The Dispensary of Ibn al-Tilmid*, p. 325.

⁵² Rue—*sadhāb*, also called *ḥayjan*, is a plant with many species, some of which grow wild while others are cultivated. The cultivated rue has many branches emerging from one stem and bearing yellow flowers. Its effect on the body is mainly to relieve flatulence, cure urine retention and decrease sexual desire. Eating the seeds is especially effective for treating dangerous and deadly poisons. *Sadhāb* was used extensively for treating uterine, gastric, and intestinal problems, worms, and muscle pains. The pollen was used to stem nose bleeding, to make ear drops and kohl, and for bandaging the scrotum to reduce pain and inflammation. It was also used to prepare a drink or dressing for scorpion stings, snake bites, and even rabies, treatment for colic in the bowels, to prevent conception and treat skin diseases. Its juice was also sprayed over hens as a mosquito repellent. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. II, part 3, pp. 7-9.

⁵³ *Nukhālah*—chaff, husks of corn separated by winnowing or threshing, was considered to have healing qualities for skin diseases such as eczema, inflammations and sores when boiled with vinegar and prepared as a dressing to apply to the affected skin. It was also effective as a dressing for swollen breasts and for snake bites. To prepare a dressing for scorpion stings the chaff was boiled with radish leaves. Chaff soaked in vinegar was used as a smelling substance for colds and coughs. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. II, part 4, p. 476.

⁵⁴ *Barnūf*—also known as *shābānik* or *shābālij*—is a plant that grows in Egypt and reaches the height of a pomegranate tree. All the parts of this plant were used for medicinal purposes. The liquid from the leaves was rubbed on the joints of epileptic children, and on the nose, face, neck, hands and feet. It was used as a smelling substance for colds, and as a carminative drink to relieve flatulence. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. I, part 1, p. 122.

⁵⁵ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, pp. 91-93.

⁵⁶ Al-Ṣāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. II, p. 197.

Tāj al-Dīn remarks that if the condition is merely a minor obstacle to walking most veterinarians choose not to treat it, because there is no really effective treatment for it. He, on the other hand, prefers to use the remedy that he prescribes in order to alleviate the animal's pain and suffering. This medicine is said to be effective not only for a specific illness but for every ailment that originates in the muscles.⁵⁷ Yet the mixture that he prescribes contains so many ingredients that it is hardly likely that his readers could acquire them all.

The treatment of lice and ticks that infested hunting birds was one of the most important aspects of every veterinarian's work. Al-Anṭākī, following earlier falconry writers, asserts that the treatment of these pests is half of the veterinarian's work, remarking that this statement is taken from ancient books, which he calls *Khāqānīyah*, apparently referring to treatises belonging to the Persian heritage.⁵⁸ Presumably the laboratories of many pharmacists were engaged in the preparation of lotions and creams for these treatments, which were also needed for use on humans. Veterinary books contain prescriptions for treatment of lice, generally based on creams and ointments for spreading on the outer layer of the skin (epidermis). The fundamental difference between creams used for humans and animals apparently stemmed from the prestige and status of the patient, but the active ingredients in the preparation itself were quite similar. Thus, for treating the horse of a sultan or a high-ranking Mamluk emir the veterinarian would probably recommend a valuable product containing expensive ingredients, while for an ordinary horse, mule, or donkey afflicted with a similar parasite he would suggest a cheaper, although equally effective, preparation. Among these simple prescriptions we find treatment recommended for instant extermination of ticks, using oil spread or poured over the affected area. Although the writer does not mention the type of oil he recommends, it is most likely that he refers to cheap, easily accessible oil. This prescription is intended not only for treatment of animals that are already visibly infested with parasites, but also as prophylactic treatment for animals that are at risk of being infested by ticks from other animals in their surroundings. In the latter case, the writer recommends rubbing the oil on the animals' hooves in order to prevent the ticks from climbing up the animal's body from the ground.⁵⁹

⁵⁷ *Ibid.*, pp. 197-198.

⁵⁸ Al-Anṭākī, *Tadhkarat ulī al-albāb*, vol. II, p. 67.

⁵⁹ Anonymus, *al-Jawād al-'arabī*, p. 279.

Another category of medications that was widely used was powders. Medicinal powders were used mainly to stop bleeding, treat purulent wounds and heal incisions in the body after surgical operations or cauterization.⁶⁰ Sometimes the writers emphasize that it is better to use powders than creams because powders help the wound to heal more quickly. Abū Bakr offers a prescription for a powder that he learnt from his father, mentioning that it is most effective for stopping hemorrhage and healing purulent wounds. This powder contains traces of *adīm ṭā'ifī*, alum and myrrh.⁶¹

5. Enemas, Suppositories and Water Treatments

Enemas were frequently used in veterinary medicine, mainly for illnesses that caused constipation or urine retention, such as colic—*mughl*, which was very common in horses, or a simpler form of colic called *qūlanj* or *qaulanj*. These two were considered serious illnesses whose origin was unknown to the veterinarians.⁶² The treatment of intestinal diseases included enemas, not only to clean out the bowels and remove stools from the lower bowel but also to introduce medications and healing substances into the rectum.⁶³ The substances used for this purpose were extracted from plants that were known to be effective, such as fenugreek, flax seeds, chamomile, violets, and onion seeds, and also from animal oils such as duck fat and chicken fat.⁶⁴

One surprising method of treatment that appears in the veterinary books includes taking a sick hunting bird to the bath-house. Thus, one writer suggests carrying a sick hawk into the bath as a treatment for a cold. He recommends staying in the hot room for one hour, then moving to the warm room and staying there for another hour, and finally, after this shared entertainment, removing the hawk from the falconer's arm and tying it in the cold room for the rest of the day. According to the writer, this treatment ensures the hawk's speedy recovery from a catarrhal cold. If the first visit

⁶⁰ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 405.

⁶¹ *Ibid.*

⁶² Abū Bakr al-Bayṭār attempts to explain the causes of bowel diseases, but his explanation is inadequate. He lists four diseases that he defines as different forms of colic. The first two are *al-tahrik* and *al-taqṭī*, for the case of which he provides no explanation. The third is *maghl*, for which he points to several causes such as the effect of cold, or eating dirt or pieces of wood with the fodder. Of the fourth and mildest type he merely remarks that it results from an accumulation of gas in the large intestine, causing severe stomach pains on the left and right sides. See *Ibid.*, pp. 85-87.

⁶³ See figures 38 and 39.

⁶⁴ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 407.

to the bath does not yield immediate results, the writer suggests visiting the bath-house again, this time adding various medications to spread on the bird's body; for example, a cream produced from bay laurel leaves—*ghār*,⁶⁵ to rub on the falcon's nostrils before taking it into the bath for the second time.⁶⁶ Bathing as a form of medical treatment is not unique to veterinary medicine. Many general medical sources feature recommendations to people to visit the baths regularly as preventive treatment and to maintain the balance of humours in the body. The medical sources usually specify such details as the most suitable times for going to the baths, the length of time to stay there, and the kinds of food to eat before and after visiting the baths.⁶⁷

Apparently a falconer entering the bath-house carrying a hawk or falcon on his arm was not a cause for alarm, because these people were mainly employed by the court or by private bath houses in the court grounds, but it is hard to visualize the scene of a horse or a donkey being brought into the baths for treatment. The solution suggested for horses was to take them into running water, like crossing a river or stream. In these cases it was not a question of washing or wallowing in the water for hygiene or pleasure, but as a treatment for certain diseases. Another water treatment deals with cases of exhaustion after an arduous journey. In this case it is recommended to splash cold water over the exhausted horse in summer and hot water in winter, splashing it over the abdomen, the testicles, and the rump, the legs and the anus.⁶⁸ In the case of injury to the horse's hocks, causing visible swelling, some sources recommend taking the horse into flowing water and having it swim or walk in the water.⁶⁹ Another use of flowing

⁶⁵ The bay, or laurel, is mentioned frequently for its many uses in preparing medicines, particularly those relevant to the respiratory system and colds. The classical name of this plant in Arabic is *al-ghār* (bay laurel), and it is commonly called 'rod of Moses'. Its botanical name is *Laurus Nobilis*, and *al-rand* in Arabic. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. II, part 3, p. 198; Ibn Sinā, *al-Qānūn fi al-ṭibb*, vol. I, book 2, p. 795, *Qāmūs al-aṭibbā'*, vol. I, p. 188.

⁶⁶ Al-Baladī, *al-Kāfi fi al-bayzarah*, pp. 238-239.

⁶⁷ Ibn Sinā, for example, devotes a section of his *al-Qānūn* to the method of treatment by baths, explaining its benefits as well as its damage to the human body. The benefits include opening of the pores, cleanliness, help with digestion, overcoming tiredness, etc. See Ibn Sinā, *al-Qānūn fi al-ṭibb*, vol. I, book 1, pp. 215-216.

⁶⁸ Al-Ṣāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. II, p. 238.

⁶⁹ *Ibid.*, vol. II, p. 261; This method of treatment, called swimming therapy, is also used today for treating horses that are recovering from various motor problems. In a recent magazine on horses, the method was actually announced as a new discovery, as if it had not existed in the past. See "Vita di scuderia: una sana nuotata," *Il mio cavallo*, Anno 15, numero 8 (Agosto 2004), pp. 34-35.

and very cold water was for treating swelling of the stallion's penis. For this purpose it was recommended to place the horse under a jet of cold water or to splash water over it, preferably sea water, if possible.⁷⁰ A similar suggestion, taking the horse into turbulent sea water, is recommended for treating a horse that cannot retract its penis into the sheath after erection.⁷¹

B. MEDICAL USE OF ANIMAL AND HUMAN SECRETIONS, BLOOD AND ORGANS

1. Secretions

Children's urine was commonly used in veterinary medicine, for instance, to treat impotence in horses.⁷² "Children's urine"—*bawl al-ṣibyān*,⁷³ as it

⁷⁰ Al-Ṣāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. II, p. 261; The use of seawater for medical treatment also appears in pharmacology books, which recommend splashing seawater over the body as treatment for digestive problems originating in the stomach or intestines or from accumulation of phlegm in the body. Sea water is also recommended for muscle problems and for many skin diseases. Under the heading 'seawater', Ibn al-Bayṭār also lists many other kinds of water that exist in nature and are used for medical purposes. Among these, he mentions rainwater, mineral water, river water, well water, fresh water, salt water, lake water, and so forth. He ascribes importance to the direction of the natural flow of the water, which affects its therapeutic qualities. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. II, part 4, pp. 407-413.

⁷¹ Al-Ṣāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. II, pp. 182-183.

⁷² Anonymus, *al-Jawād al-'arabi*, p. 232. Ibn Sīnā writes in his *al-Qānūn* that human urine is weaker than that of animals and is similar only to the urine of a castrated animal. He also notes that the most effective one is the urine of the Bedouin camel. Ibn Sīnā, *al-Qānūn fi al-ṭibb*, vol. I, book 2, p. 446.

⁷³ Ibn al-Bayṭār's comprehensive pharmacology book includes an entry on urine in which he remarks that children's urine is a widely used medication. A product called *luzāq al-dhahab*, which was prepared from the urine of children and youths, was used by jewellers for soldering golden jewelry. Its preparation involved a long intricate process. Pre-adolescent children were asked to urinate into a copper mortar containing a substance called *dastanj*, which was mixed with the urine and then placed in the sun or in a heated building for many days in order to produce a chemical reaction with the copper. The material obtained from this process, in addition to its use by jewellers to weld gold, was used to treat severe wounds that were slow in healing. The doctors recommended human urine for treating deep wounds, skin diseases such as eczema or scabies and infected wounds, and also as ear drops. Animal urine was used as an ingredient in the preparation of other medicines for treating pains in the joints. Following are some examples of the use of different animals' urine: donkeys' urine was used for treating kidney problems; drinking the urine of wild boar or oxen was supposed to help crush kidney stones; any kind of animal's urine could be boiled until it thickened, and used to treat wounds and abscesses. If the illness was more severe it was necessary to use animal urine that had a stronger effect. For example, cows' urine was considered among the most effective and strongest for treating severe inflammations and hemorrhoids in children. Ibn Sīnā also expands on the wide use of human and animal urine

was called, was also considered good for treating a disease that caused itching of the base of animals' hooves,⁷⁴ and one veterinary writer suggests using children's urine in the preparation of a medicine containing a ground substance called *kāshim*—lovage, to be used for treating a severe intestinal disease called *inqitā'*.⁷⁵ Horses that had difficulty urinating were also treated with human urine,⁷⁶ and the author of a veterinary manuscript recommends using human urine for lengthening horse's hair.⁷⁷

Urine was used mainly for external treatment, and for applying to the skin, but there is also one mention of a prescription that includes drinking human urine three times a day as treatment for a disease of the spleen. A potion containing urine is described as an antidote for snake bites, and with the addition of sodium, also for dog bites and various poisons.⁷⁸

Camels' urine was widely used for treatment of humans and animals, and in fact it appears in the list of medicines recommended by the Prophet. Presumably, this was an ancient therapeutic tradition among the Bedouin tribes in the Arabian Peninsula.⁷⁹ Ibn Sinā, for example, refers to the superiority of camel urine over human urine as a treatment for various diseases and for arresting bleeding.⁸⁰ Abū Bakr al-Bayṭār writes of veterinarians who used camels' urine for treating various skin growths such as warts.⁸¹

and he includes urine in the list of medications defined as separate. Regarding children's urine, he writes that it is useful for respiratory problems. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. I, part 1, pp. 174-176; Ibn Sinā, *al-Qānūn fī al-ṭibb*, vol. I, book 2, p. 446.

⁷⁴ Anonymus, *al-Jawād al-'arabī*, p. 232.

⁷⁵ B.L., Ms. ADD. 23,416, fol. 161r°. Another veterinary manuscript also mentions the use of children's urine for treating animals. See Bodl. L., Ms. Pococke 437, fol. 28r°. See also below in this chapter, section E-1.

⁷⁶ Anonymus, *al-Jawād al-'Arabī*, p. 301; Animal urine was suggested for treating a variety of ailments, from skin problems, joint pains, snake bites, drug poisoning, earache, eye inflammation, wounds, kidney pains, muscle pains, uterine pains, eczema, scabies and a disease called *bayād fī al-'ayn*. For diseases of the spleen it was recommended that the patient drink his own urine for three days. Female dogs' urine was said to be good for the hair, preserving its colour and sheen and preventing early graying. In general, animal urine was considered good for treating haemorrhoids, purulent wounds, skin diseases, and so forth. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. I, part 1, pp. 174-176.

⁷⁷ B.L., Ms. ADD. 23,416, fol. 27r°.

⁷⁸ Anonymus, *al-Jawād al-'arabī*, p. 301.

⁷⁹ On the use of camels' urine for healing purposes as mentioned in the Hadith tradition and as part of the literature known as "the Prophet's medicine," see Shams al-Dīn Muḥammad b. Abī Bakr b. Ayyūb al-Zar'ī al-Dimashqī known as Ibn Qayyim al-Jawzīyah (d. 751/1350), *al-Ṭibb al-nabawī*, ed. 'Abd al-Ghanī 'Abd al-Khāliq, Beirut: Dār al-Fikr, n. d., pp. 35-37.

⁸⁰ Ibn Sinā, *al-Qānūn fī al-ṭibb*, vol. I, book 2, pp. 446-447.

⁸¹ Many veterinary sources recommend removing warts by surgical means. This will be discussed in the section on surgery.

One effective treatment was spraying camels' urine on the affected area.⁸² A medicament was produced by boiling the urine and then mixing it with other substances and kneading it to form a kind of dough, which was sold in the form of cream or pills. According to various sources, it was brought to Egypt via Mecca, presumably by pilgrim caravans, which were an important source of trade for merchants, especially under Mamluk rule.⁸³ This mixture containing camels' urine served as a base for many medicines. For example, to treat *sūzanak*, a disease that affects hawks and causes purulent skin inflammation, Ibn al-Bayṭār recommends using camels' urine, which he describes as being imported in the form of a cream mixed with old vinegar.⁸⁴ The fact that we find in the sources various descriptions of preparations based on this substance indicates the possibility of different interpretations concerning the animal or mineral source of the substance known as "camels' urine." An explanation for this can be found in an important pharmacological treatise from the pre-Mamluk period, which stated that there were several sources of this medical substance, one of them based on genuine camel urine. It was sold in the form of balls imported especially from Yemen, where it was produced from soil (clay-bole) on which camels had urinated after feeding on a special grass that grew during a certain season in a particular region of Yemen. This preparation of clay and camels' urine was sold by the Yemenites during the pilgrimage season in the markets of Mecca, and from there it spread throughout the Muslim world and was used by doctors to staunch bleeding wounds. In addition to his explanation of the Yemenite source of the medication, Ibn al-Bayṭār provides an alternative explanation indicating a totally different source of the substance, stating that it is a mineral carved out of special caves in the mountains around Mecca. In this case it was a black stone called *ṣann al-wabar*, which the local Bedouins used to gather from the caves and sell to the merchants, who used it to prepare the medication.⁸⁵ He also emphasizes that it is genuine camel urine, but only after citing eight conflicting versions on the source of the material. For example, one version he cites is that it is the resin of a certain tree that grows in Yemen, squeezed to a jelly and formed into balls, which were used by doctors and veterinarians for treating wounds. In the case of humans, according to the

⁸² Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 131.

⁸³ For a discussion of the connection between pilgrimages and veterinary medicine, see chapter I, section E.

⁸⁴ Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 305.

⁸⁵ Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. I, part 1, pp. 173-174.

same version, they were also used as treatment for diarrhea, and for animals they were effective in treating deep wounds, cuts and purulent open wounds.⁸⁶ This illustrates the confusion that existed in identifying the origin of medications from animal or mineral sources.⁸⁷

Animals' faeces were also used for medical purposes. Al-Malik al-Mujāhid, for example, recommends using dried cow dung as a kind of incense—*tabasheer* (*ṭabāshīr*), as a supplementary treatment after castration of a horse or ass.⁸⁸ And for *ẓafrah* (pterygium), an eye disease that turns the horse's eyes white (a kind of cataract), they used the excreta of a grub called *abū 'uridān* as the base for a cream to be applied to the affected eye.⁸⁹ Hens' droppings also belonged to the category of 'separate medicines' for treating animals' diseases.⁹⁰ The use of animals' excrement was not unique to veterinary medicine, and we can find in the general medical literature many examples of treatments using animal faeces.⁹¹

2. Blood

Both human and animal blood were used for medical purposes, and the veterinary writers recommended taking human blood while it was still warm and fresh. This was not difficult as the blood could be obtained from phlebotomists who drew blood as part of the treatment of humans, and many of them had stalls in the market. A salient example of the use of human blood can be found in al-Baladī's book, *al-Kāfi fī al-bayzarah*, where he recommends using hot, freshly drawn human blood for treating a hawk suffering from a disease called *ṣadām*.⁹² Another example of the use of fresh blood, this time of a hen, is for treatment of a hawk with an eye disease that turns the 'eyes white' (*bayāḍ fī al-'ayn*—albugo). The blood is taken

⁸⁶ Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. II, part 3, p. 120.

⁸⁷ See for example, Ibn Sīnā, *al-Qānūn fī al-ṭibb*, vol. I, book 2, pp. 365-366.

⁸⁸ Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 273.

⁸⁹ Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 255.

⁹⁰ Bodl. L., *Ms. Pococke 437*, fol. 26r°.

⁹¹ Ibn Sīnā discusses the effectiveness of various kinds of animal faeces for treating diseases of humans. Among the animals mentioned are lizards, whose faeces were thought to be good for treating an illness called *ṣara'* and various skin diseases such as leprosy and peeling skin. Goat faeces were used to stop uterine bleeding, and to treat snake bites and rabies. Here too, the medication called "animal faeces" or animal droppings appears in the list of separate medicines in Ibn Sīnā's famous book. See Ibn Sīnā, *al-Qānūn fī al-ṭibb*, vol. I, book 2, pp. 447-448.

⁹² Al-Baladī, *al-Kāfi fī al-bayzarah*, p. 317.

from the gall bladder of a slaughtered hen and dripped directly into the eye. In this case the blood is called gall juice.⁹³

3. *Animals' Body Parts*

The use of animals' body parts occupies a central place in the veterinary treatises, and was also common in the treatment of humans throughout the Middle Ages. There is barely a medical or zoological treatise that does not describe the curative properties of some body part of an animal discussed in the book. Among these books we can mention *al-Qānūn fī al-ṭibb* by Ibn Sīnā, who provides a long list of animal hides and other body parts for curing diseases of the human body.⁹⁴

A scrutiny of treatments using animals' organs in the veterinary literature reveals a connection between the name of the disease and the type of treatment. For every illness that had a name related to a certain animal, the treatment recommended was based on the use of parts of that animal. For example, for alopecia (*dā' al-tha'lab* = 'fox disease'), a skin disease that affected both animals and humans, veterinarians recommend using the fat of a fox or a dog, but also of other animals, such as, bears, lions, pigs, and mice. One writer, summarizing the treatment of this disease, states that all the remedies that he recommends are suitable and effective both for animals and humans.⁹⁵ Another illness with a name related to an animal was 'snake disease'—*dā' al-ḥayyah*, which caused hair loss and the formation of bald spots. The treatment included boiling a snake skin in oil to form a cream and spreading it on the affected area. The fat of mice, quail, or elephants could also be used to treat this illness.⁹⁶

Another prescription involved a dog's head, and the instruction was to remove the tongue first, then burn the skull and grind the ashes to a powder and mix it with white vitriol (*qalqadīs*). This preparation is described as effective for treating purulent sores resulting from wounds sustained

⁹³ Al-Ḥasan b. al-Ḥusayn (presumably), *al-Bayzarah*, p. 88.

⁹⁴ Numerous examples of this appear in Ibn Sīnā's *al-Qānūn* and other medical books. Among the parts described we find the hide of animals such as horses, mules, sheep and goats, that belonged to the category of simple medicines, birds' wings, cockerel's peritoneum, feathers of the *warshān* pigeon, pigeon's blood, donkey's liver, various worms, camel's brain, colt's hide, blood and heads of mice, gall bladders of goats, bears, and deer, the flesh of various animals, and even human bones, which were recommended for treating epilepsy and rheumatism. See Ibn Sīnā, *al-Qānūn fī al-ṭibb*, vol. I, book 2, pp. 460-461, 469, 471, 532, 590-593, 601-602, 690 etc.

⁹⁵ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 137.

⁹⁶ *Ibid.*, p. 137.

during a hunt while fighting with a wild animal such as a tiger or a wild boar.⁹⁷ It appears from the veterinary sources that these wounds were common among hunting animals such as falcons, hawks, dogs, and cheetahs. It may be that these prescriptions were handed down from ancient classical traditions, particularly Greek ones, which included many treatments based on animals' organs, and it is doubtful whether they were actually used in Mamluk times.⁹⁸

Frogs were also used extensively in preparing medications, especially for the treatment of wounds and cuts. The evidence on the use of medications containing frogs goes back to ancient times, and they are even mentioned in the context of the Prophet Muḥammad, who refused to take such a medicine, saying that it caused suffering to those animals.⁹⁹ One writer of a veterinary book describes the use of frogs by cutting open the frog's stomach and placing it on a wound or cut sustained by a hunting animal. This treatment was considered particularly effective for wounds caused by leopards.¹⁰⁰ Not all the treatments recommended by the ancients were considered effective. Ibn al-Bayṭār remarks that, although earlier sources

⁹⁷ Anonymus, *al-Jawād al-'arabī*, p. 277.

⁹⁸ Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. II, part 4, pp. 279-281.

⁹⁹ Ibn Qayyim al-Jawziyah, in his book on the Prophet's Medicine, states that it is forbidden to use frogs for preparing drugs according to a Hadith from the Prophet. Another tradition is connected with the story of a doctor who suggested to the Prophet to use a medical preparation based on frogs, and the Prophet forbade him to kill them. To strengthen his argument, Ibn Qayyim al-Jawziyah quotes Ibn Sinā (*Ṣāḥib al-Qānūn*) as saying that anyone who eats part of a frog or drinks its blood is liable to die, therefore the doctors abandoned the use of frogs due to the danger. See Ibn Qayyim al-Jawziyah, *Al-Ṭibb al-nabawī*, pp. 259-260. As opposed to this, various pharmacological sources mention the effectiveness of using these animals, especially frogs that grow in rivers. Among the long list of treatments using frogs of this kind we find treatment for insect bites, chronic diseases, wounds, hemorrhage, skin diseases such as fox disease (alopecia), and tooth extraction. Ibn al-Bayṭār remarks that animals that graze in meadows and eat frogs may lose their teeth. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. II, part 3, pp. 126-127. Al-Damīri summarizes a great deal of knowledge related to folk medicine in which the use of frogs was widespread, and he attributes most of this material to Muḥammad b. Zakariyā al-Rāzī. One of the traditions mentioned is hanging a frog's leg on the body of a human suffering from gout—*nuqrus*—to alleviate the pain. Other folk traditions, quoted by al-Damīri without mentioning the source, refer to the use of frogs for preventing conception. The method is for the woman to open the frog's mouth and spit into it three times and then return the frog to the water. A prescription guaranteed to enhance a woman's sexual desire is to cut a frog lengthwise while the woman watches. Frogs' blood is spread on the face to gain people's affection, or on the skin after plucking hairs to prevent their renewed growth. Hanging a frog's tongue on a sleeping woman will cause her to confess to all her deeds. Eating a frog's tongue with bread will lead a suspected thief to confess to his crime. Lake frogs are effective for painless tooth extraction. See al-Damīri, *Ḥayāt al-ḥayawān al-kubrā*, vol. I, pp. 646-649.

¹⁰⁰ Anonymus, *al-Jawād al-'arabī*, p. 277.

feature many descriptions of the healing properties of frogs, he himself tried one remedy that they describe as effective for preventing excessive growth of eyelashes, and he found it ineffective.¹⁰¹

Ibn al-Bayṭār also suggests using worms that proliferate in the ground, calling them *kharāṭīn al-arḍ*. These worms were used to prepare a medication that staunched bleeding from cuts and wounds,¹⁰² and he refers to them as being commonly used for treating cut veins or arteries. The treatment he describes is simple: the worms are gathered from recently ploughed or hoed soil and crushed into a kind of dough to lay on the wound. According to Ibn al-Bayṭār, this acts immediately to stop the bleeding. In this case, he states explicitly that the prescription is quoted directly from Dioscorides.¹⁰³

Several veterinary sources refer to the use of human skull bones for treating certain diseases.¹⁰⁴ Undoubtedly, this was copied from sources foreign to the Islamic culture, presumably from Greco-Roman sources. Islamic medical sources discussing the treatment of human diseases also feature a suggestion to use human bones for treating epilepsy.¹⁰⁵ We may

¹⁰¹ Ibn al-Bayṭār, *al-Jāmiʿ li-mufradāt al-adwīyah*, vol. II, part 3, p. 126.

¹⁰² Anonymus, *al-Jawād al-ʿarabī*, p. 277. See also the veterinary manuscript in B.L., MS. ADD. 23,416, fols. 27r^o–28v^o. Regarding *kharāṭīn* Cohen al-ʿAṭṭār explains that these are worms that breed in muddy soil in fruit groves, or in bays where people fish. He writes that he discovered that these worms were effective for enlarging the penis. Another name of *kharāṭīn* that appears in this source is *ṭarṭiyār*. See Cohen Al-ʿAṭṭār al-Hārūnī, *Minhāj al-dukkān*, p. 231.

¹⁰³ Ibn al-Bayṭār, *al-Jāmiʿ li-mufradāt al-adwīyah*, vol. II, part 4, p. 325.

¹⁰⁴ A manuscript of al-Malik al-Ashraf's treatise *al-Mughnī fi al-bayṭarah* features a prescription that includes the use of human skull bones for treating an eye disease of horses. See B.L., MS. ADD. 23,415, fol. 116v^o.

¹⁰⁵ Ibn Sīnā refers to the power of human bones to cure epilepsy without questioning its veracity or its legitimacy in religious terms. See Ibn Sīnā, *al-Qānūn fi al-ṭibb*, vol. I, book 2, p. 674. Ibn al-Bayṭār also refers to this description and quotes Galen on the power of human bones to dry surplus humours in the body. We also find the case of a doctor who used to treat his patients with a medicine made from human bones without telling them, in order to avoid disgusted reactions on their part. These bones were considered to be effective in curing epilepsy and rheumatism. Other human body parts used in folk medicine to treat various illnesses of humans are also described in this source. Among these parts are a child's first baby tooth that falls and is caught before it reaches the ground. The tooth is then put on a silver tray and hung on a woman to prevent conception. The bone of a dead person is good for treating toothache. The molar of a human is placed under a sleeping person together with the right wing bone of a hoopoe to ensure deep sleep. A human's ten fingernails are cut and burned, and the ash is used to prepare a potion that affects the heart and arouses love and affection. See Ibn al-Bayṭār, *al-Jāmiʿ li-mufradāt al-adwīyah*, vol. II, part 3, pp. 172–173. Al-Damīrī suggests burying an old human skull in a columbarium to bring back doves that have left it. For treating nasal hemorrhoids—*bāsūr*—he suggests using a human bone, without stating from which part of the body it should be taken. Al-Damīrī's book features a description of parts of the human body that can be used for various medical

assume that these contents were collated and edited in a manner appropriate to scholarly medicine. It was not simply a matter of quoting 'primitive' methods of treatment, or describing the use of animals' and humans' bones and organs, but an attempt to introduce contents that were congruent with the predominant medical theory and could provide a 'scientific' explanation that emphasized the temperaments of these body parts and their influence on the temperament of the human or animal treated. Such explanations indicate their classical source, and in this case, for example, the fact that scholars from ancient times, such as Dioscorides and Galen, are cited as the source of the material strengthens this assumption. Classical medicine, or more precisely, classical pharmacology, was characterized mainly by the use of materials as they existed in nature, without resorting to complicated techniques that called for processing the material. A reading of prescriptions from ancient times indicates that they used mainly pure unadulterated materials, and that most of the medicines were based on the effect of the natural healing properties attributed to the materials or to the animals' organs.¹⁰⁶ In contrast, the Islamic medicine of the Mamluk period possessed the accumulated knowledge of centuries of progress in pharmacology and pharmaceutical testing. Those experts on herbs and botany who went out in the field, discovered new plants, and wrote comprehensive treatises on the subject undoubtedly contributed to the tremendous development of this branch of medicine and pharmacology. In addition, the methods of preparing medicines, creams, oils, kohl, pills and other types of medication were relatively highly developed, and their preparation and extraction from plants or minerals required considerable knowledge and skill not only in medicine but also in related fields of knowledge. It is not surprising to discover that these pharmacologists re-examined the knowledge contained in the writings of the ancients. Cohen al-ʿAṭṭār, the important pharmacologist of the Mamluk period, wrote explicitly that the knowledge of the ancients had to be re-examined.¹⁰⁷ Thus,

purposes; these include the teeth, the umbilical cord, hair, fingernails and more. Human bodily secretions are also recommended for many treatments, physical and mental. Besides urine and faeces, these include perspiration, dirt washed from the feet, a woman's menstrual blood, and hot semen. See al-Damīri, *Ḥayāt al-ḥayawān al-kubrā*, vol. I, p. 59. Clearly, all these descriptions of the use of humans' and animals' body parts are closer to folk medicine, which also found its place in scholarly books.

¹⁰⁶ See, for example, Abū Bakr, *Kāshif*, v. II, p. 395 (small dog, legs of pig); pp. 141, 181 (frogs); p. 141 (head of dog); p. 181 (scorpion); p. 221 (fat from dog, pig, lion, mouse and elephant); p. 169 (blood from donkey).

¹⁰⁷ Al-ʿAṭṭār al-Hārūnī, *Minhāj al-dukkān*, p. 267.

the pharmacologists challenged one of the most deep-rooted conventions in the Muslim Arab culture, which regarded the knowledge of the ancients and everything based on that knowledge as indisputable. A statement such as that of Cohen al-‘Aṭṭār in a scientific pharmacology book was clearly a challenge to an important socio-cultural-scientific convention, reflecting the spirit of a period that saw medical knowledge as a subject that had to be based on the current practise of each generation.

C. TREATMENT OF MENTAL DISORDERS AND BEHAVIOURAL PROBLEMS

1. *Treating Mental Illnesses*

In medical terms, madness was perceived as an illness caused mainly by an excess of black bile in the body. Ibn Sīnā enumerates several mental illnesses which he associates with illnesses that affect the head, and among these he mentions types of insanity that cause confusion and delusions. Melancholia is also numbered among these illnesses, as well as frivolity, stupidity, senility, and even falling in love or lovesickness. It is not surprising to discover that rabies and “mania” are also included in this category of mental illnesses. Ibn Sīnā not only refers to the temperament aspect as the cause of these diseases but also attempts to pinpoint the precise area in the brain that is the source of the problem. As to rabies and mania, Ibn Sīnā points to black bile as their source, similar to melancholia. Although he attempts to distinguish between these diseases, remarking that mania is a disease that he calls “predatory animals’ madness,” which causes confusion, disturbance, frenzy, and facial expressions that recall those of predatory animals. On rabies, he says that it makes the patient angry and violent, wanting to harm others while looking as if pleading and begging like a dog.¹⁰⁸ As with many other diseases, the methods recommended to cure these diseases were aimed at balancing the humours by means of bloodletting and medications.¹⁰⁹ In the case of frivolity and stupidity, Ibn Sīnā recommends medicines that warm and moisten the brain because the illness is caused by dryness and cold of the area known as the ‘middle part of the brain’. In addition, he suggests certain medicines that induce vomiting, as well as medicines to stimulate the heart and the mind.¹¹⁰ Apart from bleeding and other treatments designed to restore the balance

¹⁰⁸ Ibn Sīnā, *al-Qānūn fī al-ṭibb*, vol. II, book 3, p. 888.

¹⁰⁹ *Ibid.*, pp. 883-899.

¹¹⁰ *Ibid.*, p. 885

of the humours in the patient's body, Ibn Sīnā describes other methods, such as hanging, tying, sedating, and anesthesia, to prevent the patients from hurting and injuring themselves.¹¹¹

Most of the veterinary treatises refer to 'madness' as a malady that is liable to attack animals. They define madness as a disease that can be diagnosed by the appearance of specific signs and suggest treatment by medicines or other methods.¹¹² It should be noted that there is confusion in the literature between the definition of madness as a disease originating from an internal source (mental or imbalance of humours in the head) and from an external source. In some manuscripts it is also hard to decide whether the word in the text is in fact madness (*junūn* in Arabic) or another word that is calligraphically similar—*janūb*, meaning south. In both cases it is a state of madness that may be caused by the south wind that upsets the balance of humours in the head and is even described as a wind that causes madness.¹¹³ It is interesting to find the mention of climatic and weather factors as affecting man's mental state. The mention of the south wind as one of the causes of epilepsy raises the question as to whether this is quoted from an earlier, perhaps classical, source, in which the writing was not clear. Later we will see that some veterinary writers ascribe mental illness to the "mad wind"—*rīḥ al-junūn*. It may be that there was some distortion of the original text and the copiers confused the final letters of two Arabic words, so that the south wind—*rīḥ al-janūb*—became a mad wind.¹¹⁴ Abū Bakr al-Bayṭār describes three kinds of mental ailments whose symptoms indicate clearly that "something has happened" to the horse's brain. In attempting to explain this, he uses the scholarly medical language that was commonly used with regard to humans. In that context, the illness resulted from the 'jumbling' of the humours in the brain.¹¹⁵ The anonymous author of a veterinary book written in 1356 CE describes brain failure (*fasād*

¹¹¹ *Ibid.*, pp. 888-890.

¹¹² Al-Šāḥib Tāj al-Dīn discusses the effect of rabies on horses and describes the symptoms that indicate the disease. Although his explanation is not very clear, it appears that one of the signs is aggressive behaviour towards people and involuntary braying, and perhaps even biting. According to him, this illness is caused by a kind of diseased humour that flows to the brain and makes the horse mad. Consequently, the horse behaves like a mad dog, neighs incessantly and bites his rider, especially in hot weather, al-Šāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 360. See also the veterinary treatise attributed to Ibn Akhī Ḥizām, B.L., MS. ADD. 23,416, fols. 22r°, 166v°.

¹¹³ Al-Šāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, pp. 15, 329. See also the veterinary treatise attributed to Ibn Akhī Ḥizām, B.L., MS. ADD. 23,416, fols. 22r°, 166v°.

¹¹⁴ See, for example, al-Šāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 329.

¹¹⁵ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 17-19.

al-dimāgh) in great detail, indicating the symptoms by which it can be diagnosed and suggesting several modes of treatment. Elsewhere in the book he expands further on the treatment of animals that are in the grip of madness. He suggests treatment that is unconventional compared with his suggestions for treating other diseases, which were based on remedies in common use during his day, most of them obtained from various plants. In this case he suggests using medicines based on a substance prepared from owl's gall bladder and brain, ground together with a one *mithqāl* (weight) of eagle fat and mixed with the urine of a male pig. This concoction is given to the patient to inhale. According to the writer, this medicine is suitable for treating both animals and humans suffering from epilepsy.¹¹⁶ It is not surprising that he associates epilepsy in humans with madness; this was congruent with the general medical perception of that period,¹¹⁷ and the veterinary literature also refers similarly to epilepsy, called *šara*.¹¹⁸

The connection between rabies and madness also appears in veterinary treatises, particularly those on hunting and falconry. In Kushājīm's book, for example, we find a 'scientific' explanation for rabies which connects it with black bile (*kīmūs sawdāwī*) as the main cause of the disease.¹¹⁹

The veterinary writers also discuss a disease called *al-dhi'bah* in conjunction with madness, defining it as a skin disease that affects the tongue.¹²⁰ It is not clear why the writers associate this disease with madness, but apparently it affected the animal's behaviour in a way that led the veterinarians to see it as a form of mental derangement. The treatment suggested in this case is more conventional than that prescribed above, and it consists

¹¹⁶ Anonymus, *al-Jawād al-'arabī*, p. 203.

¹¹⁷ Ibn Sīnā refers to two types of epilepsy, one of adults and one of children, explaining that it is caused by disruption of the normal functioning of the respiratory system and the organs connected with it. During an epilepsy seizure, he says, the activity of the senses and movement stops, and the main damage is to the front of the brain. Ibn Sīnā's explanation of different kinds of epilepsy seizures is based mostly on the theory concerning the state of the humours in the brain, and especially the harmful effect of black bile, and he discusses the connection between melancholia and epilepsy. In his opinion, the people most susceptible to epilepsy are women and children, but adult men are not immune to it. Among the other causes of the disease, Ibn Sīnā mentions lack of blood, narrowing of the arteries, excess of phlegm in the body, south winds, prolonged visits to the bathhouse, excessive sexual intercourse, ingestion of certain plants, such as lentils or celery, that might lead to the formation of 'black blood', digestive problems, lack of sleep and emotional states like anger or fear. See Ibn Sīnā, *al-Qānūn fi al-ṭibb*, vol. II, book 3, pp. 909-913.

¹¹⁸ See, for example, al-Šāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 329.

¹¹⁹ "*wa-ammā al-kalb fa-yuqāl^u la-h^u annah^u al-junūn wa-aṣḥāb al-ṭabā'i' uaqūlūn annah^u kīmūs sawdāwī*": S.K., Ms. *Fatīh 4090*, fol. 108v^o.

¹²⁰ Anonymus, *al-Jawād al-'arabī*, pp. 206-207. [*dhi'bah-dhi'bah kabidiyah*: hepatic phlegmon]: Abū Bakr, *Kāshif*, vol. II, p. 88-89.

of excising the growth from the tongue (*dhi'bah*) with a special needle and puncturing the tongue and the ear lobes in order to release a minute quantity of blood. Another treatment includes a medicine called *sirūlan*, composed of iron crushed and ground together with a substance called *dam al-akhawayn*.¹²¹ A mixture composed of these ingredients, declares the author, serves as a smelling substance for beasts of burden, humans and sheep. Here we see that many treatments were applied to both animals and humans.¹²² Sometimes we find a more problematic discussion on "incurable madness," meaning the mental derangement of an animal that stems from its basic nature and therefore is harder to cure than madness resulting from some external factor and diagnosed as "temporary insanity."¹²³

In the veterinary sources, what are described as "brain failures" (*fasād al-dimāgh*) are usually classified according to the seasons of the year. There are several forms of classification, the most prevalent being one that consists of two seasons, summer and winter, each associated with a different kind of illness. The kind that strikes in winter is identified by the following signs: the animal shows signs of confusion (*khūliṭa fī 'aqlihi*), resulting from confusion of the humours caused by the changing seasons and disruption of the balance of humours in the brain. This is manifested by violent shaking of the head and clouded eyes. Brain failure that strikes in summer is diagnosed by drooping of the horse's head and inability to raise it. The chest muscles below the shoulder bone shake visibly, the ears are pulled back, the eyes cloud over and the animal's breath is cold and weak.¹²⁴ These, say the writers, are the signs that lead to an initial diagnosis of the disease. There is no room for confusion between the two types of brain failure, because each of them strikes in a different season of the year. After diagnosing brain failure, the veterinarian has to decide on the treatment, and here the sources suggest several methods, including most of the treat-

¹²¹ *Dam al-akhawayn*—'blood of two brothers' (dragon's blood)—is the name of a resin derived from a plant imported from the island of Sokotra. It was used to stop profuse bleeding caused by sword wounds in battle. Apart from its external application for bleeding wounds and cuts, it was also used as a potion to ease digestive problems (half a *dirham* drunk together with a soft boiled egg), and could serve as an enema to strengthen the anus and prevent the development of hemorrhoids. Another use, suggested by Ibn Sīnā, was to arrest bleeding in severe cases of hemorrhoids and to strengthen the stomach. See al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. I, part 2, p. 377.

¹²² Anonymus, *al-Jawād al-'arabī*, p. 207.

¹²³ "الجنون—طبعه مجنون يتي عليه معه ولا يستقيم أبداً": Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 161, note 30.

¹²⁴ Anonymus, *al-Jawād al-'arabī*, pp. 122-123. See also al-Ṣāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, pp. 327-328.

ment methods practised at the time, such as cauterization, medicines, diet, environmental treatment, and bloodletting. A third brain disease, called *ṣudām*, is described as similar to *birsām*, an illness that attacks humans.¹²⁵

2. Treating Behavioural Problems

Apart from sicknesses defined as mental illnesses manifested in unnatural behaviour, the veterinary literature also features discussions of numerous behavioural problems that are not defined as real illnesses but rather as faults or defects. In the case of horses, these problems concern the horse's obedience to its rider or its behaviour in public. The veterinary sources generally distinguish between two types of behavioural problems; one type is connected with inadequate training, and other stems from an inherent instinct. In the latter case they mention several behavioural problems that are probably inherited from the parents, such as stubbornness and disobedience (*ḥarrān*), or biting. Most of the veterinary writers emphasize that *ḥarrān*, described as a hereditary disease, is extremely complex and hard to correct. Cases are presented in which attempts to cure such a horse with blows and even burns on the horse's body to make it obey commands were unsuccessful, and the horse's stubbornness even led to its death in the end.¹²⁶ It is asserted that in such cases it is necessary to start taming the horse again, treating it gently and fondly in order to build a new relationship of trust between horse and tamer. One of the writers describes a special method of taming a recalcitrant horse by mounting a cheetah on its back when going out to hunt.¹²⁷

We sometimes find mention of certain behavioural problems that resulted from the influence of ill-behaved horses on others that imitate their

¹²⁵ Al-Šāḥib Tāj al-Dīn remarks that *al-ṣidām* is similar to *birsām*, i.e., pleurisy. *Ṣadām* in animals is a disease that affects the head and causes swelling, especially between the eyebrows and above the eyes, and this condition may progress to a state in which the animal cannot open its eyes. See al-Šāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 352. See also a veterinary manuscript on the treatment of horses by 'Alī al-Dawlah al-Ismā'īlī, titled *al-Ṭibb al-farasi*, which is housed in Bodleian Library, Oxford, Ms. Pococke 437, fol. 12r^o.

¹²⁶ Anonymus, *al-Jawād al-'arabī*, p. 94. Al-Šāḥib Tāj al-Dīn also devotes a chapter to the description of a rebellious horse that does not respond to commands. He calls this kind of horse *ḥarrān*, emphasizing that its behaviour stems mainly from faulty training and cruelty of the tamer. He also discusses another behavioural problem of horses resulting from inappropriate training. This kind of horse, called *munāzi'*, also refuses to obey commands, and gentle treatment is required in order to change its behaviour, al-Šāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, pp. 204-210; Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 139.

¹²⁷ Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 226.

behaviour.¹²⁸ Another cause of rebellious behaviour that appears in various sources is connected with the trainer's neglecting to train the colt to bear a rider from an early age, which had many implications for the horse's character and in particular made it harder for the trainer to break it in.¹²⁹

Shamūs or *shamūš*, was a term used for a horse that resists being mounted, at varying levels of severity. In the context of this problem, the sources describe a situation quoted from the Islamic sources relating to the legendary mare Buraq, who resisted being mounted by the Prophet Muḥammad prior to his famous nighttime visit to heaven. The traditional story is that Buraq (*Burāq*) was also a *shamūs*. After the angel Gabriel intervened and she understood what a great honour it was to carry the Prophet Muḥammad on her back, she was so ashamed of her reprehensible behaviour that sweat began to drip from her body. Muḥammad took pity on her and soothed her with a stroke of his hand, and in the end she knelt down to enable the Prophet to mount her and set out for the famous night journey.¹³⁰

At milder levels of resistance we find mention of a horse that resists having the bit in its mouth or the saddle on its back, or one that agrees to be saddled but refuses to be mounted. All these variations appear in the veterinary books and are described as behaviours resulting from faulty taming which later became the horse's second nature. A special case described is that of horses who resist being mounted by certain people while allowing others to ride them, in other words, selective resistance. The veterinary writers explain that the discrimination stems from the horses' natural dignity and noble spirit, because these animals are highly sensitive, particularly to certain kinds of behaviour of humans. They write that horses bear a grudge against people who treat them roughly or brutally, and they may even wait for an opportunity to avenge themselves.¹³¹

In the first chapter of this book I discussed the various roles of animals in Mamluk society and we saw that the veterinary writers placed special emphasis on the training of horses to be ridden by kings and sultans. For this purpose the horse had to conform to many rules relating to behaviour in the ruler's presence, and this included the need to become habituated to the noises of the *ṭabīlkhāneh*, to learn to carry bells or flags in festive

¹²⁸ Al-Ṣāḥib Tāj al-Dīn lists several behavioural problems of horses that might be hereditary (or contagious), among them disobedience, stubbornness, refusal to move, and refusal to be ridden. See al-Ṣāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 239.

¹²⁹ See figure 17 depicting a horse that reached the age of 5 years—*qāriḥ*—without being broken in.

¹³⁰ E.g. Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 228.

¹³¹ *Ibid.*

processions, or special cloth covers which it would normally flinch from. It also had to become accustomed to having predatory animals riding on its back, and to walking near large animals such as elephants or camels. These were just some of the appropriate actions or behaviours that the trainer had to teach a horse that was designated for such a role in the royal court.¹³²

The subject of training horses to cross water is also discussed in the veterinary literature, in the context of a behavioural problem that might arise due to faulty training methods, particularly the trainer's inability to prevent the horse from crouching down in the water while the trainer is mounted. Such behaviour is inappropriate, and certainly unacceptable when carrying a sultan or a high ranking emir. A similar problem is the behaviour of a horse that wants to wallow in the sand while being ridden. Both cases are imputed to faulty training, despite the fact that such behaviour is explained in the sources as the horse's natural desire to cool itself in the water or wallow in the sand.¹³³ Another behaviour, which is regarded as even worse, is defecating or urinating during a festive procession, or while carrying the sultan. This clearly concerns a natural need of the horse, but from an esthetic viewpoint it is the trainer's duty to teach the horse to control itself. The writers state that they encountered this behaviour mainly among mares, who tended to urinate on their tails and then shake the tail, spraying the urine in the direction of the rider.¹³⁴

On the other hand, there are some behavioural problems that are easier to treat. One such problem was, for example, a horse's exaggerated tail switching, which is discussed in the following manner in one of the treatises:¹³⁵

1. The problem is caused by friction of the stirrups (*mihmāz*) on the horse's flanks; since the horse cannot complain of the pain he expresses it by switching his tail. In this case, the horse's tail switching is a form of communication.¹³⁶
2. The tail switching stems from a hygienic problem of worms in the horse's body. To ascertain that this is the reason, the author recom-

¹³² Al-Šāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, pp. 199-200.

¹³³ Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, pp. 228-229.

¹³⁴ *Ibid.*, p. 229.

¹³⁵ "Bāb idhā ḥarrak al-faras dhanabah," B.L., Ms. ADD, 7513, fol. 8r°.

¹³⁶ *Ibid.*

mends performing a thorough rectal examination or examining the horse's faeces after feeding it barley.¹³⁷

3. Another possible reason is excess of black bile in the body, causing the horse to switch its tail unceasingly.¹³⁸

The problem caused by the stirrups is said to be the hardest to treat, and it is noted that many riders and trainers have despaired of curing it. Several treatments are recommended, ranging from severe to mild. One suggestion is to tie the horse's tail in a special knot that is very painful for the horse, so that as soon as he tries to switch his tail he stops because of the pain. A more drastic treatment involves surgical intervention to cut the tail. The author does not recommend this treatment and even rejects it, merely mentioning it out of respect for earlier sources.¹³⁹ Another method proposed is 're-education' using a *maqra'ah*—a special stick that was widely used to beat prisoners and criminals in the Mamluk period. The *maqra'ah* is described as particularly useful for this kind of treatment, which is performed by hitting the horse on the root of the tail every time he moves it without reason, thus training him to desist from this behaviour. The author remarks that this method may have a good effect on the behaviour of certain horses, but not all horses respond to it.

With regard to behavioural problems resulting from incorrect training methods, the veterinary sources emphasize that these may be severe because the inappropriate behaviour adopted by the horse when young became its regular behaviour throughout its life. For example, a horse that begins to stamp its feet as soon as its rider dismounts¹⁴⁰ has to be put through a new course of training, which may take a long time. Another strange behaviour is making chewing movements without any food in the mouth.¹⁴¹ One of the writers describes the case of a horse that chewed constantly and even ate the cover placed on its back. He states that he tried to treat this problem by supplementing the horse's fodder with green leaves from a plant called *jumār*, added to the barley.

Abū Bakr devotes a chapter to the behaviour of riding animals and their habits that stem from natural urges.¹⁴² He divides problematic behaviours

¹³⁷ See figure 38, showing a veterinarian inserting his hand into a horse's rectum to remove worms.

¹³⁸ B.L., Ms. ADD, 7573, fol. 8r°.

¹³⁹ *Ibid.*, fol. 8 v°.

¹⁴⁰ "*Bāb fi al-faras al-ladhī yaḍrib idhā nazal 'anhu*": *Ibid.*, fol. 9r°.

¹⁴¹ *Ibid.*, fol. 9r°.

¹⁴² Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 137.

into two main categories according to their origin—character (*khuluq*, pl. *akhlāq*) and habit (*‘ādah*, pl. *‘ādāt*). Yet there is some confusion in the text concerning the writer’s classification, and the distinction between behaviours that are related to the horse’s character and those that are the result of habits is not always clear.¹⁴³ This confusion is reflected in two lists of behavioural problems that he provides. The first includes twelve forms of behaviour that are mainly characterized by disobedience to the human master:¹⁴⁴

1. *Ḥarrān* or *ḥarūn*: This horse is characterized by one of the most difficult behavioural problems. It originates in faulty behaviour of the young colt as a result of numerous blows and punishments, as well as long periods spent carrying the rider who lingered in certain places, especially in the presence of other horses, which made the horse want to stop there. Abū Bakr explains that the blows that the young horse took from its tamer in his attempts to change the colt’s behaviour were what exacerbated its condition and accustomed it to punishments; therefore the horse did not respond to commands.¹⁴⁵
2. A horse that bites (*‘aḍḍāḍ*). This behaviour is also due to poor training. The sources explain it as the tamer’s error in playing with the colt too much and letting it lick his hands and nibble them, until it became a habit that was hard to break.¹⁴⁶
3. A frightened horse that recoils (*jafūl*) is another product of faulty training. Abū Bakr describes behaviours of tamers that cause horses to develop this characteristic; for example, frightening the young colt by suddenly throwing objects between its forelegs, blowing air in its face, and making other kinds of movements and sounds that frighten it and turn it into a coward that recoils from every little thing.¹⁴⁷
4. A horse that constantly swings its head from side to side (*nawwāḥ*), also an outcome of incorrect training. When the horse was young it was ridden by people who were not skilled in guiding it to walk in a certain direction and they commanded it to move from place to place at random. The horse developed the habit of head swinging

¹⁴³ *Ibid.*, pp. 137–139.

¹⁴⁴ *Ibid.*, p. 137–143.

¹⁴⁵ *Ibid.*, p. 139.

¹⁴⁶ *Ibid.*

¹⁴⁷ *Ibid.*

due to the lack of direction and clear commands during the training.¹⁴⁸

5. A restless horse, fidgeting, resisting the rider and trying to veer from the path (*zawaghān*). This behaviour is adopted by the horse as a result of suffering and distress. Abū Bakr mentions several possible causes of this condition. One cause might be that the horse was ridden when it was wounded, causing it pain. A very young colt that is ridden before it is capable of carrying the rider's heavy weight may adopt this behaviour when it matures. The horse's attempts to shift a heavy rider from side to side in order to ease the burden may become a habit that is hard to break even after the cause of the suffering has gone.¹⁴⁹
6. A horse that resists the mastery of its owner and of everyone else is called *naffār*. Abū Bakr attributes this problem to bad training and excessive blows that the horse received as a colt.¹⁵⁰
7. *Ramūḥ* is the name given to a horse that starts galloping the moment it is mounted. Abū Bakr explains that although this behaviour is instinctive it needs to be corrected by retaming the horse.¹⁵¹
8. A leaping horse that leaps on its two forelegs is called *tamūḥ*. This behaviour stems from a bit that is too loose in the horse's mouth. It may also be caused by an unskilled trainer who hits the stirrups too hard, hurting the horse or leading it to understand this as a command to jump, which becomes a habit with the horse.¹⁵²
9. *Shāliq* is a horse that resists being hoofed. This behaviour may be the direct result of bad experience with a veterinarian who used sharp nails that did not suit the horse's natural hooves and caused it great pain. According to Abū Bakr, any pain caused by bad experience with hoofing or any other treatment may lead to such behaviour, because the horse has a long memory, therefore any trauma experienced in the past may have negative effects on his behaviour in the future.¹⁵³
10. *Shabshūb* is the name for a horse that rears up on its hindlegs and attacks with its forelegs. This is a classic behavioural problem that

¹⁴⁸ *Ibid.*

¹⁴⁹ *Ibid.*, p. 141.

¹⁵⁰ *Ibid.*, p. 137.

¹⁵¹ *Ibid.*, pp. 137, 141.

¹⁵² *Ibid.*

¹⁵³ *Ibid.*, p. 137.

results from bad training and from the trainer's poor knowledge of riding, but it could also be caused by an overly loose rein.

11. A bellowing horse—*za'āq*—is one that begins to bellow as soon as anyone tries to shoe it or when it scents other horses nearby.¹⁵⁴
12. A horse which is terrified, especially by the sound of the *ṭabalkhāneh*, the drummers and the trumpeters in the sultan's entourage, or when it has to cross water (*yanfur min al-ṭabalkhāneh wa-ʿubūr al-biḥār*).¹⁵⁵ Abū Bakr emphasizes that this is a natural instinct of horses and not behaviour that the horse has adopted as a result of inappropriate training or some medical problem.

In the same chapter Abū Bakr provides another list, comprising seven behavioural problems, stemming, according to him, from habits (*ʿādāt*), without adding any recommended treatments:

1. Sticking out the tongue.
2. Moving the lips with loud noises.
3. Emitting clicking sounds from the hips.
4. Licking the genitals.
5. Eating faeces or manure.
6. Unfastening its straps and helping other horses to unfasten theirs. Here Abū Bakr exceptionally adds an explanation, according to which, this "irrational" behaviour derives from the horse's memory of being trained as a colt to hold various accessories. When the horse felt free and was not busy performing different tasks he automatically returned to the tasks that he had been trained to perform, such as unfastening his straps and those of other horses, which became a sort of natural instinct in the course of time.
7. Defecating and urinating in the horse's resting place.¹⁵⁶

Behavioural problems are also treated in the veterinary treatises with respect to other animals. For example, female mules, who are known to be sterile and do not go through oestrus, sometime behave as if they were in heat, and even "request," like mares in heat wooing a stallion. In these cases, the female may also secrete water and fluids described as oestrus secretions, similar to those of a mare in heat with a "temperament that

¹⁵⁴ *Ibid.*

¹⁵⁵ *Ibid.*, p. 143.

¹⁵⁶ The phrasing in the source is not clear and apparently there was a mistake in copying the verb *shakkhā* meaning to urinate, which was replaced by a word *sharakha* whose meaning is not clear (*yashrakhu fī makānihi*).

demands mating.” This phenomenon, known today as false oestrus, is described in several veterinary sources, which attribute its causes to some event that happened to the mule in the past and caused her to behave in such a strange and unnatural way. Generally, this kind of vague explanation reflects ignorance of the subject. The writers exhort veterinarians to deal with this problem using two different methods. The first involves grinding salt and pepper together and shaping the mixture into a suppository to be inserted into the female mule’s rectum. This is supposed to calm her. The second method involves the use of a substance composed of two rotles of undefined fat, which is given to the mule to drink in order to “break her spirit.” These instructions indicate the attempt to calm the animal by using substances that subdue desire, and the sources state that the female mule’s braying has no other reason than her desire for males.¹⁵⁷

A common behavioural problem of horses is obsessive scratching, which becomes very serious when purulent sores begin to appear in the areas scratched. A similar problem is that of an animal “eating itself.” We sometimes find descriptions of horses, as well as dogs and hunting birds, gnawing at their own bodies, particularly the tail, as well as scratching for no apparent reason. The veterinary writers take this seriously and distinguish between scratching or biting the skin or the tail due to fleas, ticks or other parasites, and the condition of scratching or gnawing at the tail as a form of bad behaviour. The latter is considered more severe and the treatment also takes much longer because it stems from a psychological problem that is not easy to solve, whereas eradication of parasites is simple and immediate with the appropriate medication.¹⁵⁸

Behavioural problems of hunting birds occupy a considerable part of those treatises dedicated to these animals. One such problem is described in one veterinary treatise under the heading “Treatment of a hunting bird that pulls out its feathers due to an urge without being ill with any disease or infested by lice.”¹⁵⁹ Interestingly, the author equates this disturbance to certain behavioural problems among humans. For example, he likens the bird frenziedly pulling out its own feathers to a man obsessively plucking the hairs of his beard. Similarly, the behaviour of a bird eating its talons with the help of its sharp beak, which might even pull them out by the

¹⁵⁷ Al-Malik al-Ashraf, *al-Mughnī*, p. 141.

¹⁵⁸ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 79, 335; al-Šāhib Taj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 205 (margin), vol. II, p. 192-194; al-Ghaṭrīf, *Kitāb Ḍawārī al-ṭayr*, pp. 131-132.

¹⁵⁹ Al-Baladī, *al-Kāfi fi al-bayzarah*, pp. 326-327. See also al-Ghaṭrīf, *Kitāb Ḍawārī al-ṭayr*, pp. 131-132; al-Nashirī, *Intihāz al-furaṣ*, pp. 204-205; S.K., *Ms. Fatih 3566*, fols. 118v^o-119r^o.

roots, is analogous to that of a human who constantly bites his fingernails. These two analogies clearly indicate that the phenomenon is seen as a behavioural problem, and moreover a psychological one, that has to be treated with care. This writer also distinguishes between this kind of 'psychosomatic' illness and 'ordinary' illnesses that are caused by external or discernible factors, for example, changes in the weather, parasites such as lice and ticks, digestive problems resulting from unsuitable food, and imbalance of humours in the body. In addition to all these, the writer discusses mental illness in the terms used today, and states that a behavioural problem is not a disease, using an Arabic expression meaning 'irrational action' that cannot easily be stopped.

It appears from the sources that the falconers were aware of behavioural problems that might arise in hunting birds as a result of the unnatural situation of captivity in which they lived, and many writers point to this situation as a major cause of most behavioural problems. In these cases, the treatments recommended for psychosomatic illnesses were based mainly on giving medicines or food supplements designed to calm the bird. One writer, for example, suggests several recipes and describes a variety of treatments, some of which appear feasible while others seem impractical and it is hard to visualize how these methods could be performed on a bird.

The methods suggested are as follows:

1. (Not recommended by the writer, who says that it belongs to the category of treatments taken from ancient writings). A substance called *fānidh*¹⁶⁰ has to be ground and added to the bird's regular food for three consecutive days. The writer does not state the quantities to be used, which appears to indicate his lack of interest in this remedy.
2. Ground cloves are added to the bird's regular food. The quantity of cloves to be used is such that can be held on the edge of a knife, namely, a minute quantity. This treatment is given for three days,

¹⁶⁰ Ibn al-Bayṭār, in his pharmacology book, mentions a different name—*fānid sijzī* ('Sijistān candy')—which he does not explain except for attributing it to the *Sijistān* region. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. II, part 3, p. 213. Bīrūnī refers to its *Rūmī* name, *handiqūn*, and also to another type called *al-khazā'inī*, with white foam. Another kind he mentions is *fānid al-ṣighār* ('small candy'), also known as *al-zanjabīlī*. See *Kitāb al-Saydana fi'l-ṭibb*, Abū'l-Rayhān al-Bīrūnī [sic], ed. 'Abbas Zaryāb, Tehran: Iran University Press, 1991, p. 455. Ibn Sīnā mentions *fānidh* in the list of simple medicines, explaining that it is obtained by boiling cane sugar until it thickens to form a syrup that is good for treating coughs and colds originating in the womb and bowels. This substance also helps digestion and serves as a substitute for sugar. See also Ibn Sīnā, *al-Qānūn fi al-ṭibb*, vol. I, book 2, p. 677.

not consecutively but every other day. The details specified by the author indicate that he favors this method more than the previous one.

3. The third remedy consists of radish (*fiḡl*), peeled, cored, and stuffed with beef fat, cooked until tender and fed to the bird without any other meat.¹⁶¹
4. *Wulūʿ*—Considered by the writer most effective for treating a bird uncontrollably plucking its own feathers. This method consists of tying the front wing feathers with a fine linen thread, taking special care to tie the feathers that the bird keeps trying to pull out. The writer explains that tying it up prevents the bird from reaching this part of its body with its beak, and after several failed attempts it gives up, and then the injured area starts to heal. This, then, is a method of treatment aimed at changing the bird's behaviour. It is interesting to read of this 'behaviour therapy' practised by veterinarians while such an approach is rarely mentioned in the treatment of humans for similar behavioural problems that call for a change of habits.
5. Oil extracted from the laurel plant, called *ghār*,¹⁶² is mixed with nut oil and dripped onto the base of the feathers. The writer explains that these oils help to strengthen the roots of the feathers and thus prevent their being pulled out easily.
6. The sixth treatment consists of feeding the bird with fresh lamb's brain. According to the author, this immediately has a calming effect on the bird, which then stops pulling out its feathers.
7. This method involves the use of hairs taken from an animal's forelock and cut into small pieces, placed in a bowl of milk together with pieces of a lamb's heart, washed clean of traces of blood, and

¹⁶¹ The pharmacological literature describes radish as being effective for restoring hair loss in a patient who has suffered from alopecia, and also for illnesses of the spleen or bladder, for scorpion stings, for enhancing potency in men, for crushing kidney stones, and for various skin problems. But eating radish could also have harmful side effects such as toothache and even damage to the head and eyes. See Ibn al-Bayṭār, *al-Jāmiʿ li-mufradāt al-adwiyah*, vol. II, part 3, pp. 214-216.

¹⁶² Baths containing laurel leaves were recommended for bladder and womb problems. Powder made from the leaves was good for bee stings, and a dressing made with laurel was applied to relieve pain and growths of a hot nature. Drinking a preparation containing laurel induced vomiting. The seeds were recommended for treating internal wounds and pneumonia as well as other respiratory problems, and also for treating earache, skin diseases, for shattering kidney stones, for treating liver problems, severe stomach pains, toothache, for warding off flies and even to induce abortion. See *Ibid.*, p. 198.

fed to the sick bird. The writer emphasizes that he himself tried this treatment many times and found it to be extremely effective in changing the birds' behaviour and they stopped pulling out their feathers. This prescription was recommended by someone named Dā'ūd, who bore the title of '*amīr shikār*', the man responsible for the hunting animals in the court of the Mamluk amir al-Malik al-Manṣūr, governor of Hamah in Syria.¹⁶³

The falconry sources state that hunting birds are sometimes overcome with longing for their homeland. This happens mostly when they are in oestrus, which usually occurs in the spring; hence there are more attempts to escape during this season. The writers suggest medical treatment for this problem, including the use of a little realgar (red arsenic), *zirnīkh aḥmar*, mixed with the bird's regular food. They argue that this poison acts to subdue the bird's sexual desires and mitigates its longing and its attempts to escape.¹⁶⁴

D. PROBLEMS RELATED TO BREEDING, REPRODUCTION AND FERTILITY¹⁶⁵

1. *Equines*

Horse breeding is one of the major subjects discussed in most veterinary literature. The keeping and breeding of noble horses in the court undoubtedly had great impact on many treatises, and not necessarily veterinary ones. Noble horses were those who preserved certain characteristics of the mother or father, including, naturally, physical prowess. In order to preserve these abilities, sultans and owners of noble horses needed considerable veterinary knowledge, and this led to the development of medical techniques related to reproduction.¹⁶⁶ This knowledge, in relation to horses in particular, was a matter of great concern to those responsible for the horses' treatment and reproduction before the mare entered oestrus and even before they chose the stallion to service her. In addition to dis-

¹⁶³ Al-Manṣūr Ṣāhib (the Amir) of Ḥimṣ was Ibrāhīm b. Shirkawayh b. Muḥammad b. Shādhī, who was the governor of Ḥamāt after his father's death in 637 H (1239 CE). Al-Manṣūr governed Ḥamāt until his death in 644 H (1246 CE). He was a brave and noble king who had considerable influence on the defeat of Jalāl al-Dīn Khawārizm-Shāh. See al-Baladī, *al-Kāfi fi al-bayzarah*, p. 327 (note 3).

¹⁶⁴ Kushājim, *al-Maṣa'id wa-al-maṭārid*, p. 113.

¹⁶⁵ This section deals with non-invasive methods of addressing problems of reproduction and fertility and discusses the general approach to animals' fertility. Methods involving surgical intervention will be discussed in the next chapter.

¹⁶⁶ See figure 42.

cussing the physical characteristics of the ideal breeding stallion, the writers devote sections to the differences between males and females that are designated for breeding. These differences refer mainly to their physical characteristics as well as to the differences in behaviour.¹⁶⁷

The veterinary sources reveal an important project for the preservation of special breeds that were suitable for certain functions. The horses were divided into categories according to the assignments and functions that they were expected to fill. Horses chosen for carrying Mamluk sultans obviously had the highest status and were bred with special care. For example, a colt designated to carry kings had to be trained from an early age to carry falcons with bells in order to familiarize it with these sounds and also with the king's scepter or polo stick—*ṣawlaḡjān*.¹⁶⁸ The horses were trained to serve in different roles, such as show riding at festivals and celebrations, racing, battle, and hunting. Some horses were trained especially to carry the women of the court or women in general. Besides the purebred mares of the *ḥujūr* (sing. *ḥujūrah*) strain, there was also the *rimāk* (sing. *ramakah*), which were smaller mares, and therefore more suitable for carrying women. Their mating period was usually in the spring, and it was customary to 'dedicate' one male—*fahl*—for impregnating every ten *rimāk* females.¹⁶⁹ Materials of this kind generally appear in the theoretical sections of veterinary treatises, as in the treatise of Abū Bakr, for example, who devotes a chapter to this subject under the title "Information on foaling of equines, optimal times and estimated number of breeding stallions." In this chapter he lists three kinds of breeding, according to the breeds of animals: breeding of Arabian horses, namely, purebred or noble horses; breeding of non-noble horses, *hamālīj* or *buqā'īyāt*; breeding of she-asses. Yet later in the chapter he deals only with thoroughbred horses and those mentioned in the first section.

Concerning Arabian horses, which are considered best for breeding, Abū Bakr refers to several characteristics that were noted by Arabs from the *Jāhili* period, and in particular he considers physical characteristics of

¹⁶⁷ See, for example, Abū Bakr al-Bayṭār, *Kāshif*, vol. I, pp. 311-313; al-Ṣāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 145; al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, pp. 177-179; Anonymus, *al-Jawād al-'arabī*, pp. 44-46.

¹⁶⁸ See, for example Abū Bakr al-Bayṭār, *Kāshif*, vol. I, pp. 153, 255, 289.

¹⁶⁹ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 99; Anonymus, *al-Jawād al-'arabī*, p. 49. On *ramakah*, see Ibn Manẓūr, "r-m-k," *Lisān al-'arab*, vol. 10, pp. 434-435. See also Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 311.

speed and various forms of appropriate behaviour,¹⁷⁰ remarking that since these characteristics are hereditary, it is important to choose a breeding stallion that possesses them.¹⁷¹ In another category, he mentions some defects that are not hereditary, in which case it is possible to choose a sire even if it possesses these defects, which include hair loss (*jard*), blindness in one eye (*ʿawar*), or unsteadiness on the feet (*kard*). Such non-hereditary physical defects, called *ʿāhāt* (sing. *ʿāhah*), could be ignored in a purebred stallion, which was allowed to mate with a noble mare. Abū Bakr quotes a proverb emphasizing that the choice of male is more important than the choice of female, because “the young mostly emerge more like the sire than the dam.”¹⁷² Extensive sections of these theoretical chapters include material collected from ancient sources and different heritages. Abū Bakr states that his information is based on early sources, for example, on the question of choosing a good breeding stallion with certain physical characteristics. It should be fat, healthy, and capable of impregnating ten mares, although Abū Bakr questions this number, remarking that in his opinion a good breeding stallion can impregnate a larger number of females. As opposed to this, another writer emphasizes that the use of a noble breeding stallion should be restricted to once or at most twice a year, in order “not to make him like a womanizer running wild.”¹⁷³

The breeding season is also discussed in many sources, which generally determine the beginning of spring as the most suitable time, so that the mare will foal in the early spring or summer of the following year. This is beneficial for the colt's growth and healthy development before the onset of winter. The most promising times of day for mating are also specified precisely, the best being early in the morning, although the cool evening hours are also suitable.¹⁷⁴

Among other things, the material contained in these chapters of the treatises was designed to teach the veterinarian how to discern whether conception had occurred and the mare was actually pregnant. The first sign described is that the mare stops responding to courting and begins to

¹⁷⁰ “كريمها، طليعها، قليعها، سريعها، لا جموحا ولا طموحا ولا رموحا”: Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 97.

¹⁷¹ Similarly, al-Šāhib Tāj al-Dīn's treatise includes a chapter dealing with the characteristics of the ideal breeding stallion. See al-Šāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 145.

¹⁷² An ancient Arabic adage says: “Choose the breeding stallion and pamper him by laying straw under him, because animals give birth to young that resemble their fathers more than their mothers.” Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 97.

¹⁷³ Al-Malik al-Ashraf, *al-Mughnī*, p. 152.

¹⁷⁴ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 99; al-Malik al-Ashraf, *al-Mughnī*, p. 151.

drive away the stallion. She also shows some physical changes such as contracting the udders and the vagina, secreting a white fluid similar to semen. This almost certainly indicates pregnancy, and the mare isolates herself and hides from people and animals. An interval of twenty days is specified in the sources as the waiting period between the first mating and the appearance of the first signs of pregnancy.¹⁷⁵

The veterinary writers place special emphasis on the signs that can help the veterinarian to determine the sex of the foetus. The anonymous author of a veterinary book states, for example, that marked black colouring around the teats indicates a male foetus. A male is predicted if the right teat changes colour first, along with the appearance of milk in the right udder, whereas if these signs appear first on the left side they indicate a female foetus.¹⁷⁶ The veterinarian's ability to influence the sex of the foetus is also discussed in this context. For example, the chapter contains a recommendation to have the mating take place according to the direction of the wind.¹⁷⁷ Presumably, this material concerning the sex of the foetus had its source in the classical (Greco-Roman-Byzantine) or Persian tradition. This kind of material appears in classical Arabic sources based on Aristotle's book on animals, which was translated into Arabic—*kitāb al-Ḥayawān*—by Yaḥyā b. Baṭrīq. It contains a rich material on the formation of the male and female in the mother's womb and the essential differences between the sexes. According to this book, the females of every animal species are incomplete creatures and there is something lacking in the structure of the female body, while males are anatomically, physiologically and mentally complete. The subject of temperaments plays an important part in this context. The sex of the foetus was also influenced by that side of the parent's body that would be more dominant. If the right side, which was thought to be warmer than the left, and hence more developed, was more dominant, the new born would be a male.¹⁷⁸ Al-Ṣāḥib Tāj al-Dīn refers to the choice of a time for mating according to the wind in order to ensure a male or female foetus, remarking that mating under a north wind guarantees a male, while a south wind ensures a female birth.¹⁷⁹ Yet not all Mamluk authors fully accepted such statements and they sometimes expressed skepticism, particularly concerning the effect of the winds on the sex of

¹⁷⁵ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, pp. 99-101; al-Malik al-Ashraf, *al-Mughnī*, p. 151.

¹⁷⁶ See, for example, al-Ṣāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 103; Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 101.

¹⁷⁷ Al-Ṣāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, pp. 145-146.

¹⁷⁸ Arīstūṭālīs, *Fī kawn al-ḥayawān*, pp. 135-143.

¹⁷⁹ Al-Ṣāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 145.

the foetus, for which there was no support in the Arab heritage, according to al-Malik al-Mujāhid.¹⁸⁰

Other material quoted by the veterinary writers from earlier sources refers to the possibility of influencing the colour of the foal to be born. The technique recommended is to draw a horse of the colour desired near a pool of water which is visited by a mare in oestrus. After the mare has noticed the drawing she is mated with a breeding stallion, and gives birth to a foal of the colour of the horse in the drawing. This technique is not designed only for horses, and one writer asserts that a similar technique was practised by “ancient sages,” who used to paint and sculpt images of the children they wanted in their bathhouses and bedrooms.¹⁸¹

A branch of knowledge that was very important to people who treated horses concerned the tests that had to be conducted on mares to determine the success of the impregnation by the chosen stallion. This was a kind of early pregnancy test, similar to the urine tests used in the case of women today to detect pregnancy in its early stages. Obviously, the method used at that time did not involve chemical substances and sophisticated laboratory tests. Rather, the test consisted of looking at the urine of a mare that urinated on damp grass after copulation. If the urine had dried by the next day, this was taken as a sign that the impregnation had succeeded and the sperm was implanted in the womb.¹⁸² This early test and the decision on the success of the mating was important in order to prevent other breeding stallions from attempting to mate with her, which might seriously damage or even destroy the fetus. However, one writer explains that this is relevant only in the early stages of the pregnancy, while the copulation of a mare that is four months pregnant will do no harm to the foetus.¹⁸³

The duration of the gestation period is another topic discussed in the veterinary treatises. Most of them refer to a period ranging from eight to eleven months and a half.¹⁸⁴ Al-Ṣāhib Tāj al-Dīn writes that the mare's gestation period is eleven months and a half, but this is not an iron rule and the pregnancy may range from eight months to eleven; yet at the same time he cites in a marginal note a Turkish source, according to which

¹⁸⁰ Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, pp. 189-190.

¹⁸¹ Al-Ṣāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, pp. 143-144.

¹⁸² Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 105 (note 25); Anonymus, *al-Jawād al-‘arabī*, p. 48.

¹⁸³ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 99.

¹⁸⁴ See Al-Ṣāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, pp. 101-103; al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 190; Anonymus, *al-Jawād al-‘arabī*, p. 48.

the pregnancy of a mare lasts 14 months (according to modern veterinarians, the gestation of mares lasts between 320 and 370 days).¹⁸⁵

Multiple miscarriages of mares were a major fertility problem that every veterinarian had to deal with. Some authors suggest that miscarriage is caused by the anatomical structure of the womb or its physiological functioning. They discuss the shape of the womb and ask whether its position is anatomically conducive to successful conception. They refer to the kinds of secretions from the vagina, closing or narrowing it to the extent of blocking the cervix and preventing the passage of sperm into the womb. They also discuss the size of the mare's vagina and its suitability or the damage it might cause to the penis of the male that is chosen to impregnate her.¹⁸⁶ Recommended treatments include washing the vagina and inserting a wad of cotton soaked in jasmine oil, laudanum and ground alecost (qust).¹⁸⁷ The mare should walk slowly after mating to facilitate the sperm's embedding in the womb and keeping her separate from the other horses so as to calm her.¹⁸⁸

A special recipe designed to prevent abortion of the embryo in the early days of the pregnancy included a meal of figs cooked with milk and mixed with clean washed barley. This meal was to be served to the mare daily for a week as a solution to the problem of multiple miscarriages. If this did not solve the problem, the recommendation for the following pregnancy was to try the same treatment for 14 days, and in case of another failure, for 21 days.¹⁸⁹ The recipe based on figs was just one of many designed to treat such problems and help to protect the foetus and prevent it "slipping out" prematurely. Abū Bakr adds a "scientific" explanation, stating that this problem is caused by excess of viscous humour in the womb, and when the foetus begins to grow heavier it slips out. He explains that this is not a rare event but a chronic problem, and therefore a mare with this problem should be treated with medications based on mixtures of plants with special healing powers.¹⁹⁰ The young age of the female is

¹⁸⁵ Al-Ṣāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 101.

¹⁸⁶ See, for example, Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 73.

¹⁸⁷ *Ibid.*, p. 319. See also figure 43.

¹⁸⁸ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 101; al-Malik al-Ashraf, *al-Mughnī*, p. 151.

¹⁸⁹ This prescription was designed for treating abortion, called *zalaq* (علاج الرمكة التي يتخوف) (عليها الزلق). See Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 317; Anonymus, *al-Jawād al-ʿarabī*, p. 310; Ibn Manẓūr, *Lisān al-ʿarab*, vol. 10, p. 144 [*zalaq*]; Ibn Sīdah, *al-Mukhaṣṣaṣ*, vol. 6, p. 136 [*amlāṣat*], p. 143 [*al-zalq ṣalā al-dābbah*].

¹⁹⁰ Among the recipes mentioned by Abū Bakr, we find a concoction that contains savin—*abhal*, melilot—*ḥandaqūq*, oak gall—*ʿafṣ* and cypress nuts—*jawz al-sarw*, mixed

also mentioned among the reasons of failed pregnancy.¹⁹¹ It is evident from these explanations that the Muslim veterinarians, beyond attempting to explain the causes of multiple miscarriages, sought practical solutions to the problem. One of the prevalent methods was to give the mare a special drink containing some ingredients based mainly on plant extracts.¹⁹²

Foaling was an event at which the veterinarian was required to be present. Obviously, this was essential when there were complications, but even with a smooth and easy birth the sources state that it is the veterinarian's duty to be present and help the mare. We have already discussed the importance of pedigree mares and the recording project conducted by al-Nāṣir Muḥammad Ibn Qalāwūn, including precise listing of all the male and female horses in the court and their descendants who propagated there. A project that was so important to the ruler would certainly have required the presence of a veterinarian who worked in the court and was employed specifically for this role. Al-Malik al-Ashraf describes how the veterinarian who attended the foaling had to perform several actions to help the mare. The first thing was to expose the foal's face as soon as it emerged from the womb by cutting the membrane covering the face with a sharp knife. During the birth, as the pains grew stronger and were accompanied by groaning, the veterinarian had to help the mare by pulling the foal out, holding it around the shoulders.¹⁹³ The author emphasizes that the pulling has to be coordinated with the contractions of the womb, and must be done with the utmost gentleness so as not to cause unnecessary pain to the mother. As soon as the foal is entirely outside the mother's body, the veterinarian has to tie the umbilical cord at a distance of one finger from the navel and detach it from the placenta. He has to be careful to remove the entire placenta, or what remains of it after the birth. This requires special precautions such as tying the edge of the placenta that has emerged and the part that remains inside the womb to one of the mare's thighs, so that as soon as she manages to stand up after the birth the whole placenta will come out. After

together and boiled to form a sweet white syrup. Another recipe contains the following: pepper, ginger, saffron, asofoetida resin—*hiltīt*, *Sulaymānī* sugar, and tamarind. See Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 317.

¹⁹¹ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 73; al-Malik al-Ashraf also refers to the female's tender age and her inexperience of pregnancy as possible causes of the death of the foetus. See al-Malik al-Ashraf, *al-Mughni*, p. 153.

¹⁹² See, for example, Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 319.

¹⁹³ Figure 44 shows the position of the foetus in the mare's womb when there are no complications. In this case there is no need for the veterinarian (or midwife, to use the writer's word) to intervene. The illustration also depicts the foal a few minutes after birth, standing on its feet beside its mother.

the birth, the veterinarian has to tie the mare's belly with a cord and bind it gently without tightening it so as not to hurt the mare. The last act, and the most important in the writer's opinion, is to cover the mare with a wrap to warm her body for eight consecutive days, during which he feeds her special fodder conducive to a speedy recovery. The foal also requires some help, and the veterinarian has to guide it to the mother's teats so that it will learn to suckle from them.¹⁹⁴

After the foaling, the authors of veterinary treatises recommend leaving the mare to herself for three days until her womb is cleared of all the secretions and the remains of the placenta. Sometimes the mare is given a drink of *bazlamāj* to help this cleansing process. According to Abū Bakr, it is possible for a mare to bear twins but very few of them live.¹⁹⁵ Other sources also note that it is rare for horse twins to survive.¹⁹⁶ The situation of a mare abandoning her foal and refusing to take care of it is ascribed to the mare's intense exertion and suffering during pregnancy.¹⁹⁷ Other explanations offered are the young age of the mother, the size of the foetus, or an exceptionally narrow cervix, causing the mother extreme pain during the birth. It is suggested to remove the foal from the mother, clean it thoroughly, and return it to her after some time.¹⁹⁸

The possibility for a colt to be suckled by two mothers during the same period is not excluded,¹⁹⁹ but an opposing view, expressed by al-Šāḥib Tāj al-Dīn, refutes the possibility that an adoptive mother would suckle a foal, because it might lead to the death of the natural mother.²⁰⁰ Tāj al-Dīn cites a collection of behavioural characteristics from ancient traditions which attributed to horses "human" or moral behaviour patterns in the context of mating and procreation; for example, a breeding stallion avoids copulating with his mother or sister. He also describes cases of hostility between two breeding stallions, leading one to identify the other's voice from a great distance, and mares that dream.²⁰¹

¹⁹⁴ Al-Malik al-Ashraf, *al-Mughnī*, pp. 151-152.

¹⁹⁵ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 103.

¹⁹⁶ The anonymous author of a veterinary treatise remarks that he has never seen twin colts that survived. See Anonymus, *al-Jawād al-ʿarabī*, p. 48.

¹⁹⁷ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 103.

¹⁹⁸ Anonymus, *al-Jawād al-ʿarabī*, p. 49; al-Šāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 101 (in the margins).

¹⁹⁹ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 103.

²⁰⁰ Al-Šāḥib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 145.

²⁰¹ *Ibid.*, p. 144.

A special chapter in veterinary treatises is devoted to gynecological problems of mares designated for breeding, known as *ḥujūr* (sing. *ḥujūrah*). This name was given only to mares that were marked out for conceiving and bearing thoroughbred colts. Such chapters generally include detailed information on all the subjects related to pregnancy and foaling, such as the oestrus cycle and the signs that indicate oestrus, the success of the impregnation, the length of the gestation period, and various signs that can help the veterinarian to determine the sex of the foetus. The behaviour of a mare in heat is also discussed. For example, it is claimed that the mare becomes friendlier to males during the first week of oestrus. The success of the impregnation can be determined, according to the sources, only forty days after the mating. It is also asserted that a mare whose foaling date is approaching chooses to seclude herself and keep away from humans.²⁰²

A serious problem for veterinarians was that of mares who refused to mate with stallions. They treated this problem by tying the stubborn mare's forelegs and hindlegs, *shikāl*, making resistance impossible and enabling the chosen stallion to mount her.²⁰³ In such a case, it is claimed that the veterinarian has greater difficulty in determining the success of the impregnation at an early stage, although it is possible to assess the state of pregnancy by certain signs on the body, such as the clarity of the udders and the colour of the pubic hair, the sharpness and brightness of the eyes, and contraction of the teats.²⁰⁴

A mare who failed to conceive was treated similarly to a woman in the same situation. The sources describe several unconventional methods used by doctors on both animals and humans, including the use of charms and whispers, which were believed to guarantee successful impregnation and a solution to the problem of infertility. The authors state explicitly that the same charms are equally suitable for horses and for women.²⁰⁵ Unconventional treatments of this kind, taken from the realm of magic

²⁰² Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 101.

²⁰³ *Shikāl* [*šikāl*]: fetter, hobble—for shackling the feet of riding animal. See Hans Wehr, *A Dictionary of Modern Written Arabic: Arabic-English*, ed. J. Milton Cowan, Beirut: Librairie du Liban and London: Macdonald and Evans Ltd. 1974 (third printing), p. 483 [*šikāl*].

²⁰⁴ Al-Šāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, p. 103; Anonymus, *al-Jawād al-ʿarabī*, p. 48; Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 99.

²⁰⁵ One charm, for example, includes the use of verses from the Koran, from Chapter III—“*Āl ʿImrān*,” from beginning to end. All these verses are written out in saffron in a special bowl. The words are then washed in water, this water is given to the mare or the woman to drink, and the water remaining is splashed over her face, chest, loins and thighs. See Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 411.

and based on the belief in supernatural forces inherent in the reciting of verses from the Koran or saying prayers and swearing oaths to Allāh, were not the only methods used by veterinarians of the Mamluk period, nor even the major ones. The description of these treatments is usually consigned to the end of the treatise. The main part of the discussion centres on conventional medical material based on professional veterinary knowledge and not on the use of supernatural forces and magic.²⁰⁶

Another problem discussed in the veterinary literature is that of infection of females with sexually transmitted diseases.²⁰⁷ This is discussed in depth in the context of problems of the stallion's genitals that veterinarians have to treat. The emphasis is mainly on contagious diseases transmitted by the penis. Abū Bakr, describing the treatment of diseases of the male organ, emphasizes the transmission of disease from the male to the female during copulation, and one of the diseases he mentions is *al-ḥalaq*, which, after being transmitted to the female, may in turn be transmitted to other males that mate with her in the future.²⁰⁸

It is rather interesting that the mare's inability to conceive is described by Abū Bakr as a problem that has its source in the male rather than the female. The explanation refers to the shape and size of the breeding stallion's penis, because if it is curved the semen ejaculated will not reach the womb quickly enough to impregnate the female.²⁰⁹ Therefore, the veterinarian concluded that it was vital to examine the stallion's penis in order to judge its potency. This was done by a simple test during which they examined the way in which the horse urinated and the direction of the flow. If the urine did not flow straight out but veered right or left, this indicated the likelihood of problems with impregnation, because the ejaculatory duct had to reach directly to the cervix during penetration, otherwise conception would not occur.²¹⁰ Blaming the shape of the penis for the failure to procreate rather than the infertility of the female was exceptional in the medieval medical world, which always saw the male, wheth-

²⁰⁶ For a more detailed discussion of such methods in Mamluk veterinary medicine, see section E below.

²⁰⁷ Abū Bakr al-Bayṭār mentions two contagious diseases, *al-bajal* and *al-ḥalaq*, which a breeding stallion might transmit to the mare during copulation. See Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 73-75.

²⁰⁸ According to 'Abd al-Raḥmān al-Daqqāq, the French translation of *al-ḥalaq* is 'la desquamatin pénile [penile desquamation]'. See Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 320-321.

²⁰⁹ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 73.

²¹⁰ *Ibid.*, vol. I, p. 365.

er human, horse, or any other creature, as a faultless entity that was beyond question, and failed pregnancies (and many other problems) were always imputed to something defective or lacking in the female's body.²¹¹

A surprising method of treatment designed to help in the impregnation involved the intervention of the veterinarian during the act itself. This method is illustrated in a miniature included in a veterinary manuscript, showing the veterinarian holding the stallion's penis and guiding it into the mare's vagina to ensure the success of the mating.²¹² One treatment includes introducing into the washed vagina a pad of cotton soaked in jasmine and cistus (laudanum) water mixed with ground alecost—*qusṭ*.²¹³ Another kind of pad was made with wolf's gall, castor/castoreum (*jundbāstir*),²¹⁴ musk, laudanum,²¹⁵ and nard oil—*nārdīn*.²¹⁶ More thorough

²¹¹ This stands out mainly in general medical treatises, which refer in this way to the anatomical structure of the male and female bodies and also to the balance of the humours. Woman's defective structure due to her imbalanced temperament compared with that of the man is a basic principle in Aristotle's treatise, which refers to woman as a creature that is not fully developed and resembles a young immature child. Aristotle's explanation became a model for imitation in most of the Arabic medical and zoological sources. See Aristūṭālīs, *fi Kawn al-ḥayawān*, p. 40; cf. Aristotle, *Generation of Animals*, trans. By A.L. Peck, Cambridge Mass. and London: Harvard University Press, 1990, I-xx, II-III, IV-III, IV-VI.

²¹² See figure 42.

²¹³ *Qusṭ* is *al-bustaj*—alecost [incense] *Kostus*—*Aucklandia Costus* Falc. Imula Helenium. See Moshe Ben Maimon (Maimonides), *Medical works vol. V: Lexicography of drugs and Medical response*, ed. Suessman Muntner, Jerusalem: Mossad Harav Kook, 1969, p. 95 [338]; see also Oliver Kahl, *The Dispensatory of Ibn at-Tilmiḍ*, p. 328 [*qusṭ*—alecost (Index of technical terms)].

²¹⁴ Kahl, *The Dispensatory of Ibn at-Tilmiḍ*, p. 325. According to Ibn al-Bayṭār, this substance was obtained from a sea creature that can live both in water and on land, and on which fish and crabs feed. The same author writes that thanks to its warming and drying properties, this animal was used extensively in the preparation of various medications for treating illnesses that called for warming and drying the body, and also for women with menstrual problems. The same material could also be burned to prepare an aromatic substance for the treatment of illnesses of the lungs and the head caused by cold and damp, and also for amnesia, snake bites, urinary problems and diseases of the spleen, *umm al-ṣibyān* and *al-ṣar'* (epilepsy), poisoning and uterine pains. Almost every part of this animal was used to prepare powders or substances that were good for almost every illness. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. II, part 3, pp. 235-236. In the medical writings of Maimonides this medication appears in a somewhat different form (*jundbādustūr*), and is described as a substance extracted from the testicle of the *kashṭamūr* (*samūr*), Moshe Ben Maimon (Maimonides), *Medical works vol. V: Lexicography of drugs and Medical response*, ed. Suessman Muntner, Jerusalem: Mossad Harav Kook, 1969, p. 34 [no. 79].

²¹⁵ *Ladanum*, also called *labdanum*, is the resin obtained from cistus plants. See Moshe Ben Maimon, *Medical works vol. V: Lexicography of drugs*, p. 65 [no. 208].

²¹⁶ *Nard*, in Arabic *nārdīn*, is an aromatic plant from which spikenard oil is prepared. According to Ibn al-Bayṭār, *naradīn* is 'Indian sunbul' (*Valeriana jatamansi*), which was used to prepare medicines for treating problems of the duodenum and liver, stomach ulcers, and various gynecological problems. It was also used for preparing creams to treat eye

treatment, recommended by al-Malik al-Mujāhid, includes invasive intervention.²¹⁷

The breeding of other equines such as donkeys and mules is also discussed in the Mamluk veterinary treatises. Abū Bakr, in a chapter entitled 'Procreation of the *akādīsh* and *barādhīn*', describes the best kinds of donkeys and horses for crossbreeding in order to produce the best male and female mules.²¹⁸ In the context of the discussion on mixed breeds, the same author attempts to retrace the history of domestication, attributing primacy to the person who first mated different species of animals and obtained a new breed such as the mule. Abū Bakr, in his treatise, attributes this act to King Khusraw of Persia, stating that he was the first to mate horses with "cows," apparently referring to donkeys.²¹⁹ The existence of chapters featuring discussions of the different types and breeds of donkeys, and determining which of them are better for crossbreeding, testify to the importance of this animal to Mamluk society.²²⁰

Veterinary sources include a special chapter devoted to discussion of the characteristics of the anticipated product of the crossbreeding of horses and donkeys. Apparently it was necessary to distinguish between the different kinds of mules, mainly due to the particular functions for which they were designated. For example, some were chosen to be ridden by noble women of high status, such as the wives and daughters of the sultan, while others were intended for the traditional role of beasts of burden and were expected to bear heavier loads than those borne by horses or donkeys. There were also mules earmarked for pilgrimages to Mecca or for arduous trade caravans to places such as the south east of the Arabian Peninsula

diseases. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. II, part 3, pp. 48-51, part 4, p. 471; Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 319. See also Leigh Chipman, *The World of Pharmacists in Mamlūk Cairo*, Leiden and Boston: Brill, 2010, p. 279.

²¹⁷ See Chapter VIII, section F.

²¹⁸ According to *Lisān al-'arab*, a *birdhawn* is the name for a horse that does not belong to the Arabian breed, namely, is not noble. Abū Bakr mentions those that are associated with various places throughout the Islamic world, for example, *birdhawn khurasānī*, which he also defines as *Rūmī* (Byzantine). He adds that the mating of this horse with a female of the *baqā'ī* breed produces better offspring than that of a *baqā'ī* male and a female *khurasānī*. See Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 327; Ibn Manẓūr, *Lisān al-'arab*, vol. XIII, p. 51 [b.r.dh.n].

²¹⁹ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 327.

²²⁰ See, for example, Abū Bakr al-Bayṭār, *Kāshif*, vol. I, pp. 327-330; al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, pp. 363-372; al-Malik al-Ashraf, *al-Mughnī*, pp. 162-168; al-Šāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, pp. 137-141.

(*ʿīdhāb*) and the other port cities that played an important part in the economy of the Mamluk state.²²¹

The veterinary sources distinguish between the various kinds of mules mainly by their countries and regions of origin. They also distinguish clearly and consistently between the kinds that are considered better and worse. Donkeys are also divided into different categories, the main distinction being geographical origin—Egypt, Yemen, the Maghreb, and so forth. Donkeys that mate in the same geographical area are also divided by region as to which are the best breeders. For example, those from Egypt, and especially from the rural areas along the Nile, al-*Ṣaʿīd*, are considered the best.²²²

Apart from classification by geographical origin, the veterinarians attempted to classify mules according to their parents. The writers distinguished between a mule born of a male donkey and a mare and a hinny, i.e. one born of a stallion and a female donkey. In the former case, a donkey designated to impregnate a mare was chosen carefully in order to ensure the birth of a 'good' mule. Among the criteria for choosing such a donkey we find physical perfection, good general health, and very long broad ears. The mare chosen should belong to a breed called *rakmah*. This mating could be expected to produce a mule with a large healthy body. Another possibility described is the mating of a donkey with the above named characteristics and a mare of the *rūmīyah* or *baqāʿīyah* breed. The mule born of this mating would be the best, with a strong body, a broad back and hindquarters, thick strong hands and feet, a very fit and strong animal with great stamina, that could endure harsh working conditions and bear heavy loads.²²³ Hinnies were graded at a lower level, and are described as having a small head and body, low in height and with a flattened nose. Although a hinny might be born without these defects, it would never equal one born of a female horse, neither in beauty nor in characteristics, and not in its endurance and ability to carry heavy loads. The authors remark that this distinction is logical because the size of the female's womb is what determines the size of the foetus, therefore it is obvious that a mare will give birth to a bigger and stronger mule than that born to a she-donkey.²²⁴

²²¹ See chapter I for a discussion of animals in Mamluk society.

²²² Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 329. See also Housni Alkhateeb-Shehada, "Donkeys and Mules in Arabic Veterinary Sources from the Mamlūk Period (7th-10th/13th-16th Century)," *Al-Masāq*, vol. XX, No. 2, September 2008, pp. 207-214.

²²³ Abū Bakr al-Bayṭār, *Kāshif*, vol. I, p. 329.

²²⁴ *Ibid.*

At all events, it is interesting to see that the characteristics of the male were considered less relevant in this case.

Finally, the quality of a mule was also attributed to the environment in which the parents grew up. The writers state that the best offspring is one born to parents who live in broad open spaces because of the quality of life and the clean air.²²⁵

In animals, the lactation system is closely connected to issues of pregnancy and birth. The veterinary writers dealt with this subject in depth, particularly with regard to horses and domesticated grazing animals. The importance of milk as one of the major components of human nutrition was clearly decisive in this matter, and the treatment of horses' breastfeeding included treatment of various medical problems related to lactation and its physiological functioning. Abū Bakr suggests several techniques for helping a breastfeeding animal that suffers from excess milk accumulating in the udders and congealing, which may be dangerous and is often accompanied by blood-clotting and inflammation. The treatment includes bandaging the udders with dressings that contain various emollients.²²⁶ Dripping of excess milk from the teats was another problem that had to be dealt with. It could be caused by various factors, such as a teat with a large opening, milk formed very quickly, or the newborn's need for less milk.²²⁷ The treatment of this problem was similar to that recommended in general medical treatises for breastfeeding women with the same problem. In the first stage the doctors and veterinarians suggested milking the breast to empty it, then steeping red *ṭafal* (potter's clay, argil) in wine vinegar or

²²⁵ *Ibid.*

²²⁶ For example, the inside of hot fresh bread mixed with saffron. The inside of the bread can be replaced by the insides of cotton seeds mixed with equal quantities of quince seeds (*ḥabb safarjal*) and Indian galangal (*khūlān hindī*), crushed together, mixed with vinegar and spread on the udder. Another treatment suggested for the same problem includes the following substances in equal quantities: *sakabīnaj* (sagapenum), *mughāth* (glossostemon root), and *ḥiltīt* (asafetida resin). The three are mixed and kneaded to form a dough together with wine, and spread on the udder. These preparations were designed to dissolve the congealed milk. See Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 331.

²²⁷ *Ibid.*, pp. 77-79.

rose oil mixed with egg yolks and *Ishrās*.²²⁸ This mixture was then formed into dough and applied to the leaking breast.²²⁹

Another disease that was diagnosed by swelling of the udders was a matter of concern to veterinarians. The sources distinguish between a swelling, in Arabic *waram*, today known as a benign or malignant tumour, and the accumulation and congealment of milk in the milk ducts.²³⁰ In this case, too, Abū Bakr compares animals to women and presents the various distinctions he makes regarding the symptoms, stating that one is related to the baby's biting the nipple while feeding, which might cause swelling of the breast, both in a mare and in a woman.²³¹ He views this problem as simple and easy to treat, while the condition of a mare whose udders swell even when she is not feeding and not in a phase when her body is supposed to create milk is more serious. In this case, he explains, the swelling is the result of an internal flow of milk due to a blow, a wound, a cut or bite, and this requires the doctor to use more thorough measures, including binding the swollen udder twice a day with bandages containing substances such as Armenian bole²³² mixed with rosewater. A different

²²⁸ *Ishrās* or *ashrās* (asphodel) is a plant common throughout the east, particularly in the mountainous regions of *Ḥarān* in Syria. It was sold both as a powder and as roots of the plant. Ibn al-Bayṭār states that it was used to glue books. In many cases this plant was confused with the root of a similar plant called *khunthá*, but the *ishrās* root is longer and it is reddish-yellow in colour. It is also harder to crush and grind. The substance obtained from it hardens quickly when pasted and it is quick and easy to prepare. One takes a very small amount and adds water to cover it, mixing it, and then applying it immediately to the part to be stuck. Of all the adhesives prepared from plants this one is considered the best. In Andalusia another plant called *birwāq* is referred to as *ishrās* but this is a mistake. There are some who argue that *ishrās* is the root of a plant called *mughāth* (glossostemon root), which is also widespread in the East and is used for pasting. Two strains of *birwāq* are known in the East, one of which is common in the Jerusalem area. The major medical use of *ishrās* was for preparing bandages and dressings to place on breaks or sprains to set broken bones or heal ruptures. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwīyah*, vol. I, part 1, pp. 51-52.

²²⁹ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 333.

²³⁰ *Ibid.*, p. 331.

²³¹ *Ibid.*

²³² This clay—*ṭīn armanī* (Armenian bole), imported from Armenia, is very dry, yellowish in colour, and easy to grind. It was dried and used for wounds and infections of the bowels, hemorrhage, menstrual problems, "secretions from the head," and purulent sores in the mouth. It was considered to be good for tuberculosis patients because of its property of drying sores that develop in the lungs in the course of this disease, and thus stops the coughing. Asthma sufferers who were infected during the "Black Death" and drank from this medicine prepared from Armenian bole recovered quickly. This clay could be prepared as a drink for someone with a slightly high temperature but is not feverish, otherwise it had to be mixed with water. Ishāq b. 'Amrān also refers to the use of this clay in treating victims of epidemics either by drinking or by spreading on the sores. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwīyah*, vol. II, part 3, pp. 151-152.

treatment involves applying a medical substance prepared from coriander water, *ḥay* 'alam spelling different in note below water,²³³ *khūlān*,²³⁴ or alternatively, preparations consisting of luffa water,²³⁵ wine vinegar, *bdellium africanum*—*muql azraq* and *khūlān*. An alternative preparation recommended for applying to injuries is composed of oil of violets and nenuphar—*nīlūfar* flowers,²³⁶ mixed with *khūlān* and coriander water, boiled together, and spread on the udder with a feather. A simpler substance that is recommended for treating this problem consists of red loam moistened with rosewater before spreading on the swollen udder.²³⁷

A subject that was largely avoided by veterinary writers as well as by general medical writers was that of contraception. Abū Bakr is one of the writers who deals with it, not without apologising and explaining his motives for introducing the subject. He writes that although it is forbidden to mention contraceptive drugs in a book for fear that they might fall into the hands of immoral people and heretics who could use them to harm horses, he has nevertheless chosen to mention them in his treatise because he wants it to be as complete as possible. The prescription that he describes

²³³ Apparently this refers to a plant called *ḥayy al-‘ālam*, described in Ibn al-Bayṭār's pharmacology book as a medicinal plant that has a cooling and drying effect. It is a type of mold that grows in shady crevices and tunnels. Among the uses of this plant the writer mentions the treatment of eyes, bowels, purulent growths, burns, gout—*nīqris*, headaches, drying uterine secretions, and stopping diarrhea. See *ibid.*, vol. I, part 2, pp. 305–306.

²³⁴ *Khūlān* is also called *al-ḥadaq*. Ibn al-Bayṭār writes that it is a thorny bush that was used to treat problems of peeling skin, growths, purulent wounds in the mouth and anus, and sores in the ears. It was also used to prepare kohl for the eyes, for stomach ulcers, to staunch bleeding from the womb, and to prepare enemas to treat chronic diarrhea. Other uses were for making pills to treat rabies, for strengthening the roots of the hair, to treat mosquito bites, nail problems, and severe poisoning. See *ibid.* pp. 279–280, 355.

²³⁵ Ibn al-Bayṭār writes that the luffa plant serves to cure many medical problems. He suggests using its seeds to induce abortion. Due to its dry temperament, it is ideal for drying wounds, treating nasal cancer, draining fluids from the chest, treating arthritis, coughs, hemorrhoids, leprosy, and also for impotency and for stimulating sexual desire. See *ibid.*, vol. II, part 4, pp. 390–392.

²³⁶ *Nīlūfar*, water lily (nenuphar—*nymphaea*), appears in Ibn al-Bayṭār's list of medicinal plants. He says that drinking its root is good for problems of the spleen, chronic diarrhea, and stomach ulcers. He also suggests mixing it with tar to form a paste or cream to apply to various parts of the body. This cream is effective for skin diseases such as the one known as 'fox disease' and for leprosy. The plant is also described as being good for drying fluids and bodily secretions; hence it was widely used for treating problems of involuntary leakage of semen, chronic uterine secretions, menstrual bleeding, and so forth. The water lily appears in the list of soporifics and it served as an analgesic, especially for the relief of severe headaches. Its seeds were drunk to treat bladder problems. See *Ibid.*, vol. II, part 4, pp. 486–487.

²³⁷ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 331.

is very concise and it is doubtful whether it would have been effective. One may assume that Abū Bakr deliberately chose to give just one prescription, so that it would be understood only by those veterinarians and professionals who could understand and make proper use of it. The treatment consisted of a pad soaked in rabbit's gastric juices—hare's rennet—*infīḥat arnab*,²³⁸ and inserted into the vagina during mating.²³⁹ Tar—*qaṭrān*,²⁴⁰ another substance that was thought to have contraceptive properties, was applied to the male and not the female, and the treatment consisted of rubbing *qaṭrān* on the male's penis while he was mounting the female but before penetration. It is worthy of mention that this substance, which was designed for veterinarian use, particularly with horses, was very similar to that recommended for the same purpose in medical and pharmacological literature dealing with humans.²⁴¹ Although the veterinary authors do not specify the reasons for giving treatment to prevent conception, it may be assumed that this treatment was designed to moderate the heat of a mare who demanded mating while not allowing her to conceive.

²³⁸ *Infīḥah* or *Infāḥah* = hare's rennet. The use of hares' gastric juice and that of other animals is recommended by Ibn al-Bayṭār, who offers recipes for its use. It was considered effective for some gynecological problems such as uterine discharges, menstrual difficulties, and blood clots in the breasts. Ibn al-Bayṭār's book also features a prescription that either facilitates or prevents conception, depending on the manner and time of its use. To aid conception it should be administered in the form of a suppository after washing away the menstrual blood, but drinking the same substance prevents conception. The author also describes the efficacy of the male hare's *infīḥah* in helping to produce male offspring, while drinking the *Infīḥah* of a she-hare will result in the birth of a female. Deer's *infīḥah* is also thought to have contraceptive qualities. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwīyah*, vol. I, part 1, pp. 88-90; Abū Rihān Bīrūnī, *Kitāb al-Saydana fi'l-ṭibb*, p. 82. [*infāḥat arnab*—hare's rennet, Kahl, *The Dispensary of Ibn al-Tilmīd*, index of technical terms, p. 326].

²³⁹ Cohen al-ʿAṭṭār describes a similar recipe using *anfīḥat arnab* with oil of violets, in order to facilitate pregnancy rather than prevent it. In his pharmacology book he describes no less than seven different preparations that aid conception, most of them based on botanical materials or body parts of animals such as scorpions. Among all the recipes listed in the chapter on enemas and suppositories, there is only one for inducing abortion of a live or dead foetus. There are also many recipes for aphrodisiacs for women and men alike. See al-ʿAṭṭār al-Hārūnī, *Minḥāj al-dukkān*, pp. 185-191.

²⁴⁰ Tar—*Qaṭrān*, also called *sharbīn*, is described by Ibn al-Bayṭār as a substance obtained from the resin of a tree that bears fruit similar to that of the cypress but smaller. This substance was widely used in the production of drugs and cures and served particularly to treat skin problems and damage from parasites such as ticks and lice. Ibn al-Bayṭār also refers to its veterinary use for treating flocks of sheep infested with lice, as well as for children. He mentions its use for contraceptive purposes by rubbing it on the penis before copulation. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwīyah*, vol. II, part 3, pp. 80-82.

²⁴¹ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 321.

Providing recipes or instructions for inducing abortions was considered a matter of even more severity, not just because of the Islamic religious prohibition but from the viewpoint of professional ethics, therefore it is rare to find material of this kind in veterinary sources. One of the few sources that contain such material is a treatise by an anonymous fourteenth-century author. This book, *al-Manṣūrī fī al-bayzarah*, contains several prescriptions for inducing abortion in dogs, but the writer suggests using them in situations of difficulty in giving birth and only when there is real danger to the mother. The recipes include some ingredients that are well known from the general pharmacologic literature, and some that were also used for humans. For example, the author mentions violet seeds,²⁴² which he recommends boiling in water and giving to the labouring mother to drink. He also recommends ash²⁴³ mixed with a sweet drink and used to make a suppository to insert into the vagina, or black hellebore—*kharbaq aswad*²⁴⁴—ground and mixed with meat and fed to the animal, and others.²⁴⁵

²⁴² The use of violets was very common in medieval Islamic medicine. Different parts of the plant served the pharmacologists in the preparation of various medications, but the main use was extraction of oil from the flowers for treating headaches and reducing fever, as well as preparing drugs to decrease sexual desire in humans. It was also used to treat other medical problems such as diarrhea, skin diseases, respiratory disturbances and colds, as well as problems resulting from accumulation of yellow bile in the body. On the other hand, the use of this plant also risks causing depression. It is interesting that, contrary to the veterinary treatises, the most famous pharmacological writings do not mention the use of the seeds for inducing abortion. However, Cohen al-ʿAṭṭār al-Hārūnī refers to the use of violet oil (*duhn al-banaṣṣaj*) mixed with hare's rennet for facilitating pregnancy. See Ibn al-Bayṭār, *al-Jāmiʿ li-mufradāt al-adwiyah*, vol. I, part 1, pp. 156-157; al-ʿAṭṭār al-Hārūnī, *Minhāj al-dukkān*, pp. 43, 190.

²⁴³ The use of ashes—*ramād*—as medical material appears in the pharmacological literature. Ibn al-Bayṭār mentions its use for staunching bleeding after all other remedies have failed. He also presents a broad range of its uses according to the types of trees burnt. Some of the uses mentioned are treatment of hemorrhoids, skin problems, pains in the joints, and also as a supplement to substances used in cauterization. See Ibn al-Bayṭār, *al-Jāmiʿ li-mufradāt al-adwiyah*, vol. I, part 2, pp. 443-444.

²⁴⁴ Black hellebore—*kharbaq aswad*—is a plant that was used to prepare mixtures for treating various skin diseases, such as warts, eczema, itching, peeling skin, and so forth. It was also used for treating melancholia, madness, arthritis, inflammation, illnesses resulting from accumulation of yellow and black bile, as an aperient, and for toothache, among others. This plant also served in the preparation of suppositories to be used by women to increase menstrual bleeding and also to induce abortion, or as the author expresses it, to kill the foetus. See *Ibid.*, vol. I, part 1, pp. 321-323.

²⁴⁵ Ibn al-Ḥaṣṣhāʾ (attributed to), *al-Manṣūrī fī al-bayzarah*, p. 163. Methods of removing a dead foetus from its mother's womb will be treated in the following chapter.

2. Dogs

In order to ensure the birth of pups with excellent hunting skills the Veterinary treatises recommend resorting to astrology, and they indicate which astrological chart is best for ensuring impregnation that can result in excellent pups.²⁴⁶ Regarding the time of mating, they write that it should not take place within sight of humans in order for the pups to be of the highest quality.²⁴⁷

The veterinary sources present some basic zoological facts related to the reproduction of dogs. For example, the gestation period is said to last 60 days, which is close to the modern value of 63 days. However, according to the medieval writers, there are some females whose pregnancy lasts for up to 72 days, and others even longer (90 days).²⁴⁸ A pup that is born prematurely (before 60 days of pregnancy have elapsed) is regarded as having no chance of survival. Pups are born blind and they begin to open their eyes after 20 days. The mother's milk appears thirty days into the pregnancy. The average life expectancy of a dog is twenty years. A female in heat can mate with several males of different breeds and colours, black, white, mottled, and yellow; hence she can give birth to pups of different colours, indicating that they are the offspring of different fathers.²⁴⁹

Besides the choice of hunting dogs,²⁵⁰ the sources contain a wide variety of basic information on various subjects, such as signs of oestrus and pregnancy, periods of oestrus, duration of pregnancy, methods of dealing with pups, the age at which the pups should be separated from the mother, when to terminate suckling, and the kinds of food to serve the bitch during pregnancy and suckling. Some special treatments described are designed to help bitches to conceive more easily and quickly.²⁵¹ Good and gentle care of the dogs was a basic principle in their treatment and the authors advise not taking the females on a hunt before or during pregnancy. This was considered elementary and is emphasized in most of the sources. A male,

²⁴⁶ Ibn al-Ḥashshā' (attributed to), *al-Manṣūrī fī al-bayzarah*, p. 163.

²⁴⁷ *Ibid.*

²⁴⁸ Ibn Mankalī states that the gestation period is four months. See Ibn Mankalī, *Uns al-malā*, p. 98. See also al-Ḥasan b. al-Ḥusayn al-Bāzyār (presumably), *al-Bayzarah*, p. 141; Kushājīm, *al-Maṣā'id wa-al-maṭārid*, p. 132; Ibn al-Ḥashshā' (attributed to), *al-Manṣūrī fī al-bayzarah*, p. 163.

²⁴⁹ Ibn Mankalī, *Uns al-malā*, p. 145.

²⁵⁰ Al-Ḥasan b. al-Ḥusayn al-Bāzyār (presumably), *al-Bayzarah*, p. 145; Kushājīm, *al-Maṣā'id wa-al-maṭārid*, p. 137; Phillott and Azoo, "On Hunting Dogs," p. 599.

²⁵¹ Ibn al-Ḥashshā' (attributed to), *al-Manṣūrī fī al-bayzarah*, p. 164.

too, was given a period of rest and freedom from hunting after mating.²⁵² The food recommended for pregnant bitches included barley bread and cows' milk. The writers explain that barley bread strengthens a pregnant bitch more than 'burr' bread made of wheat.²⁵³ The postpartum period was regarded as critical for the mother and her pups, and the writers suggest some special ways of helping the mother to clean out her vulva and womb and expel the placenta and the remaining fluids. If one of the pups behaves violently, the sources recommend keeping it away from the mother.²⁵⁴ The sources recommend spreading a soft rug under the pregnant mother before the pups emerge, so that their entry into the world will be smooth and pleasant. They advocate a minimum of four months suckling by the mother before the pups are separated from her.²⁵⁵ The medical treatment of the pups included the use of special substances to avoid harming them. The treatment was designed mainly for killing ticks and other parasites, a matter that was central in veterinary treatment and guaranteed the development of healthy hunting dogs. The training of the pups was also done gently: the trainer would rub honey and oil on his hand in order to tempt the young pups to approach him and lick his hand, thus helping them to get used to him and make friends with him.²⁵⁶

The choice of pups that show promise of being good hunters is a subject that is emphasized in the treatises. The pups chosen may be of both sexes, according to characteristics that are common to males and females, such as large bodies, thick tails, and eyes as red as the eyes of lions, indicating courage. Other characteristics are the colour of the coat, the width of the chest, the size of the canines, and so forth. Hairless dogs (*ajrad*) could also be considered if their physical characteristics were similar to those described. Regarding females the emphasis was also on characteristics related to the reproductive system, such as the size of the udders. The time of oestrus was another important factor in the choice of females, with

²⁵² Al-Baladī, *al-Kāfi fi al-bayzarah*, pp. 98, 163.

²⁵³ According to Ibn al-Bayṭār, *burr* is the name of the wheat. Under the heading 'wheat' he quotes Galen, who claims that eating wheat is harmful to horses. Referring to Dioscorides, he writes that eating raw wheat causes the growth of worms in the stomach and that an effective treatment for rabies is chewing wheat grains and bandaging the area of the bite. Citing al-Rāzī, he notes that wheat is best for making bread and is also the most suitable for humans. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. I, part 1, p. 123; part 2, pp. 298-299.

²⁵⁴ Ibn Mankalī, *Uns al-malā*, p. 98.

²⁵⁵ *Ibid.*; Ibn al-Ḥaṣṣhā' (attributed to), *al-Manṣūrī fi al-bayzarah*, p. 171.

²⁵⁶ *Ibid.*

preferences for those whose oestrus was in late spring.²⁵⁷ A single pup born in one whelping was considered purebred and superior to both its parents. If two pups were born together, one male and one female, the male was considered better than the female, but if three were born together, one of them female and resembling the mother, this one was considered the best of the three. If only one of the three was a male, he was considered the best. There was also a test that could be performed to determine which the best pup was in a whole group.²⁵⁸

Sometimes the veterinarian had to thin out some of the pups born to one mother in order to keep the best pups that could successfully feed on their mother's milk. They would choose three pups out of seven, or two out of four, to stay with the mother, the explanation being that the mother could only supply a certain amount of milk, and the other pups were given to another mother to feed. As well as moving them from mother to mother, the sources refer to the possibility of supplementary feeding to help the pups to develop more quickly. The writers suggest various recipes and methods designed to enrich the mother's milk and make the non-biological mother feed pups that are not her own.²⁵⁹ In total contrast, we also read of concoctions designed to effect quick and painless destruction of pups. One author describes a concoction consisting of three ounces of bulls' bile, a medicine called *kamāshūr*, oleander leaves,²⁶⁰ and six ounces of silver (oxide or powder?)—*khabth al-fiḍḍah*,²⁶¹ mixed with oil and fed to the doomed pup. A strange method suggested for lengthening a dog's body was to dig a hole in the ground, place the pup inside and tie a piece of meat

²⁵⁷ *Ibid.*

²⁵⁸ Al-Ḥasan b. al-Ḥusayn al-Bāzyār (presumably), *al-Bayzarah*, p. 145; Kushājīm, *al-Maṣa'id wa-al-maṭarid*, pp. 137-138; Ibn al-Ḥashshā' (attributed to), *al-Manṣūrī fī al-bayzarah*, p. 165. See also above, Chapter V, section E-8.

²⁵⁹ Ibn al-Ḥashshā' (attributed to), *al-Manṣūrī fī al-bayzarah*, p. 165.

²⁶⁰ In the pharmacological literature the oleander is described as extremely poisonous and even fatal to both humans and animals. Ibn al-Bayṭār refers to its toxic character that is fatal to certain animals which he lists in his book, such as dogs, donkeys, mules and other herd animals. For this reason it was wisely used in the preparation of mixtures for disinfestations and protection of the house against mosquitoes and other harmful insects. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. I, part 2, pp. 372-373.

²⁶¹ Birūnī explains that *khabath al-fiḍḍah*—(silver oxide?) is identical with *qlīmyā* (*iqḷīmyā'*—cadmia), which apparently is silver powder, formed during the casting or melting of silver. According to Ibn al-Bayṭār, this material was used extensively in the preparation of medications, particularly of creams to arrest bleeding and treat wounds and cuts. Medications containing this material were also used for treating various eye diseases. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. II, part 4, pp. 279-281; al-Birūnī, *Kitāb al-Saydana fī'l-tibb* [sic.], p. 236.

to the top of the hole so that the dog would try to jump up and reach the meat, thus stretching its body and especially lengthening its neck.²⁶²

The attempts to find creative solutions to feeding problems resulting from illness or death of the mother or for some other reason are surprisingly innovative. For example, we find an account of a bitch who refused to suckle her pups and they needed to be fed by another lactating bitch. To overcome the reluctance of the adoptive mother and persuade her to accept the pups, the dog keepers rubbed them with her milk.²⁶³

3. *Raising Young Hunting Birds*

A major issue in the falconry literature is the raising of hawks and falcons that are taken into captivity and trained to hunt in the service of humans. A point to be emphasized is that breeding of predators in captivity was not possible until the twentieth century, so that all the information on breeding in the falconry treatises refers to its natural occurrence in the wild. This can partly explain the confusion reflected in the hawking and falconry literature concerning the mating of birds of prey of different "species," as described above in chapter V. This confusion is also expressed in the following passage in al-Baladī's book, according to which, the female hawk, when in heat, is said to be able to mate with other kind of birds. But after discovering that her mate (*yasfaduḥā*) is not a hawk of her kind, she "is revolted by him, and chases him until she catches him and kills him."²⁶⁴ He writes that when laying eggs the female needs a male hawk (*zurraq*) to be her partner and share the task of guarding and warming the eggs. Al-Baladī explains that the existence of hawks that differ in behaviour, intelligence, nobility, hunting skills, courage, strength, and weakness is due precisely to the fact that the females mate with different hunting birds, which inevitably affects the characteristics of the offspring. A chick that is not born of the mating with a male hawk is called *naghl*, meaning bastard.²⁶⁵ The Peregrine, on the other hand, is said to mate only with its own species.²⁶⁶

Hunting birds were classified according to the age at which they were caught in the wild. The younger the chicks when caught, the more highly they were valued. The term '*fāriḥ*' was used to refer to a nestling's prestige

²⁶² Ibn al-Ḥashshā' (attributed to), *al-Manṣūrī fī al-bayzarah*, p. 176.

²⁶³ *Ibid.*, p. 165.

²⁶⁴ Al-Baladī, *al-Kāfi fī al-bayzarah*, p. 98.

²⁶⁵ *Ibid*; al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, 23; Ibn Qushtumur, *al-Qānūn al-wāḍiḥ*, K.K., Ms. 978, fol. 17v^o.

²⁶⁶ Al-Baladī, *al-Kāfi fī al-bayzarah*, p. 101.

and its prospect of becoming a trained and disciplined hunting bird. Yet there were also types of birds that were regarded as best caught after they had become fledgelings. The names given to the birds mentioned in the sources mostly reflect the age at which they were caught in the wild, as follows:²⁶⁷

1. *Ghiṭrāf* (*ghīṭrīf*) is the name given to a newly-hatched chick caught in its parents' nest, its colour white like cotton and its eyes completely closed.²⁶⁸ This chick, raised in captivity without ever knowing its parents, is regarded by the veterinarians as the most prestigious hunting bird. This is related to the change in its nature "which acquires the nature of man" and becomes friendly with him.²⁶⁹ This bird is also considered to be one of the few that do not try to escape from captivity.²⁷⁰

2. *Urqawān* is a young bird with 'red' feathers that has already learnt to fly from the nest accompanied by its parents, but has not yet learnt to hunt by itself and is still fed by its parents. Among large hawks these are described as having red eyes, long legs, a thin tail and a short neck.²⁷¹

3. *Kāfi* is a young bird that grew up with its parents, learnt to fly and also to hunt by itself, and even experienced the first rain while still free in the wild. It is generally considered inferior to the two above-mentioned, but is sometimes credited with good hunting skills, although the writers explain that it is harder to tame and treat.²⁷²

4. *Zunnaj* is a wild falcon or other hunting bird that had already renewed its feathers before being taken into captivity. In this last stage there are many terms referring to the situation of renewing plumage. A *zunnaj* that renewed its feathers once before being caught is called *muqarniṣ muḩtadir*, while a bird that renewed its feathers in captivity is called simply *muqarniṣ*.²⁷³ The term *karraz* also refers to a bird that has changed its feathers, and

²⁶⁷ This system is customary in most Arabic falconry books. See, for example, al-Baladī, *al-Kāfi fi al-bayzarah*, 124-130; al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, 25-26; Ibn Qushtumur, *al-Qānūn al-wāḑiḩ*, K.K., Ms. 978, fols. 18v^o-19v^o.

²⁶⁸ Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 109.

²⁶⁹ This is known among zoologists today and is called imprinting. See, for example, V.G. Dethier and Eliot Stellar, *Animal Behaviour: Its Evolutionary and Neurological Basis*, New Jersey, 1964, pp. 81-82.

²⁷⁰ Al-Baladī, *al-Kāfi fi al-bayzarah*, pp. 109-110; al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, p. 25.

²⁷¹ Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 110; al-Ghiṭrīf, *Kitāb Ḍawārī al-ṭayr*, p. 26.

²⁷² *Ibid.*

²⁷³ Möller suggests that the less common term, *karraz*, refers to a falcon that renewed its feathers when it was free. Based on this, he opines that the word *karraz* in Arabic refers to the renewal of plumage in captivity. Hence, a falcon that has changed its plumage once in captivity is called "one-year *karraz*," while one that has changed its plumage twice in captivity is called "two-year *karraz*." See Möller, *Studien*, p. 131.

according to the sources this bird is the hardest to tame. Al-Baladī compares it to an old man who cannot change his habits and does not forget his homeland; therefore he will always try to escape captivity.²⁷⁴

One of the basic guidelines for identifying females and distinguishing them from males in the various species of hunting birds is connected specifically with the fact that while the males of all species of animals are known to be larger than the females, and this applies to all types of non-predatory birds, among the birds of prey the females are larger than the males and better hunters.²⁷⁵ The females were obviously more expensive. It is not surprising, therefore, that the question of distinguishing between male and female chicks is discussed in falconry treatises.²⁷⁶

The raising of the chicks as soon as they are taken from the nest until they are able to eat by themselves occupies an important place in the hawking and falconry books. For a chick in the stage of *ghitṛif*, Ibn Qushtumur writes that a soft cotton bedding has to be prepared, to be spread at a later stage with poplar leaves. At this early stage chicks were fed with white of egg and some pieces of bat meat. Later they were given pigeon chicks and mouse meat, until they start standing on their feet. From this point the diet changed to a more diversified assortment of meat, such as kid, mutton or chicks. Citing al-Zaynabī, the same author notes that eagles at the stage of *ghitṛif* had to be fed with other sorts of meat, and special care had to be taken in watering them directly from the mouth of their tamer.²⁷⁷

Al-Baladī pays special attention to the the treatment of young birds. At the earlier stages of captivity, tamers have to take into consideration the natural habits of the bird, which is used to be fed by its mother rather frequently. For a bird in the stage of *kāfi*, he recommends an early morning feeding in winter, whereas during the summer it should be fed two hours later, because of the greater length of the day. For a bird that had already shed its feathers, the meal should be served four hours after sunrise, and at a later stage even two or three hours after sunrise. A special pattern is recommended for young peregrines, taking into consideration this bird's habit to hunt very early in the morning. Therefore, the young bird in captivity had to be fed before sunrise.²⁷⁸

²⁷⁴ Al-Baladī, *al-Kāfi fī al-bayzarah*, p. 110.

²⁷⁵ *Ibid.*, p. 111; Kushājim, *al-Maṣa'id wa-al-maṭārid*, p. 195.

²⁷⁶ Al-Baladī, *al-Kāfi fī al-bayzarah*, pp. 77-79, 90, 93, 111-112; al-Ghitṛif, *Kitāb Ḍawārī al-ṭayr*, pp. 24-30.

²⁷⁷ Ibn Qushtumur, *al-Qānūn al-wāḍiḥ*, K.K., Ms. 978, fols. 33v^o-34r^o.

²⁷⁸ Al-Baladī, *al-Kāfi fī al-bayzarah*, pp. 183-184.

Al-Baladī also recommends a special diet for young birds during moulting. Bat meat, hedgehog meat (without the skin) and dried hornets are said to be most appropriate for this situation. To accelerate the moulting process, a sauce composed of balsam, wormwood—absinth (*afsintīn*), ginger and honey was added to the meat.²⁷⁹ If some of the old feathers do not fall off by themselves the tamer is required to pluck them out carefully, so as not to hurt the bird. A special kind of oil is then spread over the same spot.²⁸⁰

4. *Cheetahs*

This animal has inspired many authors to flights of imagination and fantastic descriptions of extraordinary characteristics, due to their lack of zoological knowledge concerning its mating and reproduction processes. Not only were people unable to make it reproduce in captivity, they never once saw it in the act of mating while in captivity or in the presence of humans. This led some writers to develop a special theory ascribing to the cheetah human characteristics such as embarrassment, dignity and modesty, and they argued that the cheetahs' shyness and insistence on guarding their privacy were what prevented them from mating in the presence of humans. The cheetah experts described the mating of male and female cheetahs in the wild in poetic terms, writing that the male cheetah approached the female in oestrus in order to mate with her, but she did not yield easily, so he had to stroke her, gently touching all parts of her body to quieten her, and only at the end of a long session of caressing did she allow him to touch her vulva, signaling her agreement to mate with him by biting his shoulder lightly.²⁸¹

E. THE USE OF CHARMS AND WHISPERS

The veterinary literature also includes various healing methods that are clearly derived from folk medicine. These are mainly magic signs, whispers, organic substances, and religious materials.²⁸²

²⁷⁹ *Ibid.*, p. 355.

²⁸⁰ *Ibid.*, pp. 366-368.

²⁸¹ Kushājīm, *al-Maṣa'id wa-al-maṭārid*, pp. 184-185. Al-Nāshirī said that one of the characteristic traits of the female cheetah is shyness (*ḥayā'*). See al-Nāshirī, *Intihāz al-furaṣ*, pp. 61-62.

²⁸² These methods, that appear in books discussing the treatment of humans, are surprisingly similar to those suggested in treatises devoted to the treatment of animals, as will be illustrated later in the chapter. For a discussion of one of the treatises containing

1. *Magic Signs and Numerology*

Magic signs used in veterinary medicine originate from the alphabets of ancient nations and cultures, such as Nabatean, hieroglyphic, Phoenician, Syrian, and others. Sometimes we find tables featuring magic signs in veterinary books. One of these, which is graphically depicted in the treatise, is composed of two identical tables that have to be sketched on the ground, each table a square divided into nine small squares, and in every small square the following numbers are written out in words: one, ten, and four, written in a different order in each line. When the tables are ready, the animal to be treated is walked over the two tables alternately. This treatment is supposed to help against a disease that affects horses, causing difficulty in urinating.²⁸³ This magic method is suggested as a supplementary treatment to a medicine containing a substance called *kāshim rūmī* ('Byzantine lovage')²⁸⁴ mixed with children's urine—*bawl al-ṣibyān*.²⁸⁵

Al-Ṣāhib Tāj al-Dīn, in his veterinary book, suggests using magic signs to treat *al-mughl*, a severe disease of horses. A manuscript preserved in Istanbul features a sketch of a table comprising four squares, in each one of which there is a sign of one or two letters. The meaning of these signs or letters is not clear, but the text stresses their power to cure illnesses, especially the above-mentioned illness of horses. According to the author, these signs are also effective for treating humans, sheep, and other animals that contract diseases of the digestive system, such as one that causes swelling of the abdomen and colic.²⁸⁶ Magical signs can also be numbers that perhaps had certain meanings in the distant past but in the course of time they were forgotten and were used without any explanation. Usually, the

magic material designed for humans, see Ron Barkai, *Science, Magic and Mythology in the Middle Ages*, Jerusalem: The Van Leer Jerusalem Institute, 1987, pp. 64–66. See also Ullmann, *Die Medizin im Islam*, p. 221, referring to a work by Jildakī, which also contains short descriptions of magical treatments of animals.

²⁸³ Al-Ṣāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. II, p. 170. See figures 46 a–b.

²⁸⁴ Ibn al-Bayṭār describes a plant called *kāshim rūmī* that was used for treating various diseases. Among its medical qualities he mentions that its seeds or roots have diuretic properties. This plant was widely used in herbal mixtures due to its fragrance, and its effect was to improve the smell and taste of medicines. It also served as a less expensive substitute for cumin—*camūn*. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. II, part 4, pp. 297–298.

²⁸⁵ A veterinary treatise by an anonymous author features the same prescription of children's urine mixed with lovage—*kāshim*, a fragrant plant that grows in high mountains. The author suggests this prescription for a severe form of colic called *inqitā'* in Arabic. See Anonymus, *al-Jawād al-'arabī*, p. 232. See also Chapter VII, section B-1.

²⁸⁶ Al-Ṣāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. II, p. 226.

sources that recommend this kind of magic do not offer explanations of the meanings or the reasons for using certain signs or numbers, and undoubtedly the success of this method was partly due to the strict secrecy surrounding it.

Al-Ṣāhib Tāj al-Dīn also suggests using magic to treat *al-inqitā'*, which is one of the hardest illnesses to cure, but only after recommending several treatments with medications containing various substances such as children's urine.²⁸⁷ He declares to have discovered the magic method in ancient books and has not tried it himself, thus hinting at his skepticism in this respect.²⁸⁸ This treatment, too, included drawing tables on the ground and writing Arabic letters and numbers on them. After the sketch with the magic signs had been prepared, the animal had to be walked over the tables in a certain way which, according to the ancient sources, ensured the curing of the disease, or more precisely, the expulsion of the cause of damage from the body.²⁸⁹

Numerology, or the belief in the healing properties or supernatural influence of numbers, was also present in veterinary medicine, and here too, the writers usually state that these materials are drawn from earlier sources,²⁹⁰ implying that the use of this sort of remedies was not the invention of the Mamluk authors, probably dating back to much earlier times.

2. Organic Substances

The most popular method of folk medicine involved the use of organic substances to treat all kinds of physical problems for which scholarly medicine had no solution. The widespread use of organic substances apparently stemmed from the fact that popular belief attributed to many substances healing powers that did not have to be understood or explained logically and scientifically. Herein lies the uniqueness, and perhaps the advantage, of popular medicine. Organic substances were more concrete

²⁸⁷ *Ibid.*, p. 144.

²⁸⁸ *Ibid.*, p. 145.

²⁸⁹ *Ibid.*, p. 145; See figure 46-a.

²⁹⁰ The author suggests an ancient remedy, consisting of drawing two tables on the ground, each one containing letters parallel to certain numbers. The tables are depicted like this:

س ح ع ١٥ سس
ل مة و بر بر س
ش ع ٥ د بر س

These numbers are said to have healing powers that can cure illnesses such as severe colic. B.L., Ms. ADD. 23,416, fol. 160r°.

than other magic methods, and therefore could be more attractive. There are numerous examples of the use of organic substances in the medical treatment of animals, and the ingredients of many medicines included a certain substance whose healing properties were apparently based on folk medicine. One example of this includes the use of the tail of a predatory animal or the horns of a deer tied round a horse's neck to protect it from the evil eye or from a severe colic, called *mughl*.²⁹¹

3. Whispers and Religion Materials

Besides the magic methods described above, a special place was dedicated in the veterinary treatises to the use of whispers (*ta'āwīdh wa-ruqyāt*), which, most probably, also originated from ancient cultures. It may be assumed that the whispered words had certain meanings in the past, but over the centuries these words were apparently distorted and what remained were the special sounds of the letters. Some examples of this may be found in veterinary sources describing prescriptions for treating diseases of animals by whispering in the animal's ear or writing on its body. Abū Bakr offers three different charms that include a string of unintelligible words which he suggests carving on the hooves of horses suffering from colic.²⁹² The three charms include the following meaningless expressions:

- a. "qalash qalshish laqlashish qaqashish" [قلش قلشيش لقلشيش قلشيش].
- b. "aghtash aghtūsh aghtāsh aghtīsh" [أعطش أعطوش أعطاش أعطيش].
- c. "hārish ārish kalamūsh lālāyūsh" [هارش أرش كلموش لالا يوش].

As will be semonstrated below, this kind of charms may sometimes be combined with Islamic religious materials.

Religious materials are indeed more frequently used as alternatives for purely medical methods in the veterinary treatises. The generally consist of words and sentences uttered by the believer while praying or swearing an oath, and in this context, sayings of the Prophet and verses from the Koran. This is not the place to analyze the reasons for choosing the particular chapters (suras) that were most widely used for therapeutic purposes, but we may assume that they were chosen for their content and included supplications to God to spare the believer from evil spirits and from damage caused by the evil eye. The verse known as the Throne Verse, or the Verse

²⁹¹ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 411.

²⁹² *Ibid.*

of the Chair (2:255), which describes the power of Allah and his unbounded ability in time and space, was, and still is, one of the verses most commonly recited for guarding against harm.²⁹³

One of the important sources from the Mamluk period that contains a wealth of material on treatment by whispers, charms and other unconventional techniques is the treatise of the fourteenth-century al-Bawnī (d. 622 H/ 1363 CE). His book, *Manbagh uṣūl al-ḥikmah* (The Source of the Roots of Wisdom), includes four epistles dealing with belief in the use of whispers and secret charms. He remarks from time to time that the use of a certain charm involving a whisper based on names and appellations of God is designed to ward off the evil eye that causes damage to humans and animals.²⁹⁴ The prevalent opinion in Islam is that the *jinn* are descendants of Iblis, Satan, who was driven out of the Garden of Eden after he enticed Eve to eat of the forbidden fruit. A serpent was also driven out with him. This version appears in a fourteenth-century veterinary treatise, whose author refers to the mating between two different species and the possibility of producing offspring. Naturally, he cites the example of mules, which are born of the mating of horses with donkeys, and compares them with genies, which are the fruit of the mating of *Iblīs* (Satan) with the serpent. The author emphasizes that all humans are descendants of Adam and Eve, and all genies are descendants of Iblīs and the serpent.²⁹⁵ The use of techniques of whispering and charms such as those documented in several sources testifies not only to the fact that humans and animals are perceived as equally vulnerable, but also to the perception that every animal has a soul exactly like that of a human, and therefore is liable to be hurt by the same things that hurt the human soul. The evil eye, whose source is in Satan or one of his descendants, is the entrance of demons into a living body, human or animal, and subordinating it to their evil wishes.²⁹⁶ The only way to banish demons from a human body was to use whispers and charms

²⁹³ Shams al-Dīn Muḥammad b. Abī Bakr al-Zarī al-Dimashqī known as Ibn Qayyim al-Jawziyyah (d. 751/1350), *al-Ṭibb al-nabawī*, ed. 'Abd al-Ghanī 'Abd al-Khālīq, Beirut: Dār al-Fikr, 1957, pp. 131-132. In veterinary treatise see, for example, Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 415.

²⁹⁴ Aḥmad b. 'Alī al-Baunī (d. 622 H/1225 CE), *Manbagh uṣūl al-ḥikmah*, Beirut: al-Maktabah al-thaqāfiyah, 1951, pp. 70, 258.

²⁹⁵ See 'Abd Allāh b. Muḥammad b. Jazī al-Gharnāṭī, *Kitāb al-Khayl: maṭla' al-yumn wa-al-iqbāl fi intiqā' kitāb al-iḥtifāl*, ed. Muḥammad al-Khaṭābī, Beirut: Dār al-Gharb al-Islāmī, 1985, p. 201.

²⁹⁶ *Ibid.*

based mainly on verses from the Koran, prayers, and letters of the Arabic alphabet, which were believed to have supernatural powers.²⁹⁷

It may be that the inclusion of these materials in professional veterinary treatises stemmed from the authors' assumption that they might help to relieve the suffering of animals. Al-Malik al-Mujāhid includes in his veterinary book several treatments belonging to the realm of magic, and in one case he recommends using a whisper based on the magic power of certain verses from the Koran. According to him, the treatment in question is meant for horses suffering from a disease that causes difficulty in urinating accompanied by severe pain. Whispering is generally suggested as a complementary treatment after the use of conventional methods, and in this case, too, the author suggests first introducing into the penis medication containing musk mixed with various substances. After the treatment, he recommends that the veterinarian, whom he refers to as *al-ṣāni'* (the worker or artisan) immerse his hands in pure sand and rub the horse's back and hindquarters, while reciting three times two chapters from the Koran called '*al-mu'wadhatayn*'.²⁹⁸ In addition, he has to whisper the following words: "This is a severe stomach ache! Get out of this horse who belongs to so and so, son of so and so, if so and so (the owner of the horse) did not share in his belief another God as well as Allāh."²⁹⁹

States of fatigue and everyday physical problems were also treated using charms. The anonymous author of the veterinary book *Kitāb al-Bayṭarah* cites examples of the use of charms and whispers for treating horses' ailments. For instance, he mentions a whisper that is suitable for treating chronic drowsiness or lethargy.³⁰⁰ In this case, the treatment is composed of two elements; one, from the realm of scholarly medicine, involves the use of oil of violets, which is known to be effective for curing illnesses of animals and humans, and the other consists of whispering two short chapters from the Koran seven times. According to this prescription, the whispering has to be done before applying the violet oil to the horse's body.³⁰¹

²⁹⁷ Ibn Qayyim al-Jawzīyah, *al-Ṭibb al-nabawī*, pp. 129-132; Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 413-415; Sa'īd al-Laḥām, *al-Tadāwī bi-al-Qur'ān al-karīm*, Beirut: Dār al-Fikr al-Lubnānī, 1991, pp. 96-102.

²⁹⁸ The last two Suras of the Koran, 113 (The Rising Day—*Surat al-Falaq*), and 114 (Men—*Surat al-Nās*). See *al-Qur'ān*, A Contemporary translation by Ahmed Ali, Princeton: Princeton University Press, 1993, pp. 560-561.

²⁹⁹ Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 263.

³⁰⁰ The word *karā* in the text, here translated as drowsiness, has several meanings. It also means running or galloping. Another meaning, closer to the context here, is the slow walk of camels. See Ibn Manẓūr al-Ifriqī, "k-r-ā," *Lisān al-'arab*, vol XV, p 222.

³⁰¹ See Anonymus, *al-Jawād al-'Arabī*, p. 308.

Dealing with sleep problems such as insomnia or excessive sleeping was part of the veterinarian's role, and in this context the problem and its treatment are discussed in a manner that is equally appropriate to humans.³⁰²

The writer of another veterinary treatise presents a situation that was considered to be common among women—being invaded by a demon, but in this case the victim was a mare. A situation of this nature was generally a typical one for prescribing charms or whispers to influence the demon and cause it to leave the body, but in this instance the author suggests an alternative, and even exceptional, approach: the use of conventional means to expel the demon from the mare's body. He prescribes a medicine based on several substances that have healing properties, such as pepper, ginger, musk, saffron, date peel, wine and barley, to be given to the mare to drink for three consecutive days.³⁰³ Later in the chapter, the author presents some other versions of whispers. One of them, for example, which is supposed to act to expel demons from horses' bodies, is intitled "an efficient and proven treatment." It opens with the Bismillah, continues with two lines and two additional expressions that are unintelligible, and is followed by a sort of religious prayer.³⁰⁴ Another one only includes the regular ver-

³⁰² The said manuscript features a detailed description of the use of charms and whispers. The author provides this information under the heading "Making charms"—*amal*. He describes various kinds of charms, some of them based on the properties of letters and words, some on the powers of numbers, and others on verses from the Koran and sayings of the Prophet. Most of the charms are applicable both to humans and animals, but the author also describes a treatment designed only for humans, which he recommends for dealing with problem of children's crying or for sleeplessness. He describes a charm containing words in the form of a square composed of letters of Koranic verses from Chapter 112 (*Sūrat al-Šamad* or *al-Ikhlāṣ*—Pure Faith). See B.L., Ms. ADD. 23,415, fols. 112v°, 113v°.

³⁰³ *Ibid.*, fol. 114v°-115v°.

³⁰⁴ *Ibid.*, fol. 107r°:

للتابعة نافعة مجربة
بسم الله الرحمن الرحيم
ارفاش فاعسي مرقاش اسطاف خطوف خطاف
سعداس فرواس الله رب الغرة فهللوا طهللوا استنوع ازغ
تسوح ارمو حسبنا الله القديم الازلي الابدني ان الذين
قتلوا المؤمنين والمؤمنات ثم لم يتوبوا فلهم عذاب
جهنم ولهم عذاب الحريق انشدكم يا معشر الجن
بالله العزيز الواحد القهار والولي الدافع بالعهد الذي اخذه
عليكم سليمان بن داود عليهما السلام ان تظهروا حامل
هذا الكتاب ان تتركوا في حرز الله تعالى وحمايته وصلى
الله على سيدنا محمد وعلى آله وصحبه وسلم أجمعين
تم

sion of the Muslim prayer or the supplication that the Prophet is believed to have used to whisper to his horse when demons invaded it.³⁰⁵

Abū Bakr al-Bayṭār is particularly salient in using this kind of materials. In a chapter summarizing the various methods of treatment he devotes a separate section to the use of charms and whispers.³⁰⁶ He describes some whispers based on sayings of the Prophet, prayers and supplications to Allah to avert illness or damage that might threaten the animal, charms composed of various objects such as beads taken from the horns of deer, or tails of certain animals, a thread woven from camel hair or taken from a horse's cheek hairs and even from bamboo, designed to be hung around the horse's neck to ward off the evil eye or colic (*mughl*).³⁰⁷

Abū Bakr also recommends using a whisper that can help both women and female animals to conceive. The instructions for preparing the charm include Sura 3 of the Koran, the chapter on the tribe of 'Amrān. This is the second longest Sura in the Koran (after the *al-baqarah* Sura—"The Cow"), and it comprises 200 verses. The verses had to be written with saffron on the sides of a large bowl made of copper or tin. After writing, the bowl had to be washed with water, which was then given to the sterile mare or woman to drink, and the water that was left was splashed over her face, chest and loins. Not everyone could prepare this charm; only experts were allowed to do so.³⁰⁸

Following are some expressions and sentences with magical influence that are mentioned in veterinary treatises: Abū Bakr describes how these words are used by carving them with a sharp knife on the animal's hooves. They include sentences such as '*qalash qalshīsh laqlashīsh qalqalshīsh*' [قلش قلشيش لقلشيش قلقلشيش], or '*aghṭash aghṭūsh aghṭāsh aghṭīsh*' [اغطش اغطوش اغطاش اغطيش]. Another sentence described as having a magic effect is '*hārish ārish kalamūsh lālāyūsh*' [هارش ارش كلوش لالا يوش]. He recommends using each of these meaningless phrases for a specific illness, for example, colic, for which there was hardly any solution in conventional medicine. In this case, the whispering was designed mainly to alleviate the pain. The author remarks that he found the prescription for warding off the evil eye in early veterinary books.³⁰⁹

³⁰⁵ *Ibid.*, fol. 109v°.

³⁰⁶ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 411-415.

³⁰⁷ *Ibid.*, p. 411.

³⁰⁸ *Ibid.*

³⁰⁹ *Ibid.*

Abū Bakr also presents a complete formula, which he suggests copying inside a charm designed to be hung on a horse's body.³¹⁰ This formula consists of a dialogue between the angel Gabriel and the evil eye, which has emerged from two stones—one black and one white. In answer to the angel's question as to where it is going, the evil eye describes all the targets it aims to reach in order to harm them. The long list of victims that the evil eye intends to attack includes an ox plowing the land, a bird in flight, a merchant conducting his business, an artisan working, a lecturer presenting his arguments to the audience, a man sitting down, a baby in its mother's arms, a bride sleeping, a ewe being milked, and a camel carrying a heavy load on its back. Above all, the evil eye declares, it intends to strike at horses, and will attack them in almost every situation in which it finds them: galloping, walking, or resting. On hearing this list, the angel Gabriel exhorts the evil eye not to harm each one of those mentioned and orders it instead to direct its intentions to a certain tree on which there is a snake with two eyes, one of fire and one of water. The angel tells the evil eye to pour the water over the fire and thus to neutralize the damage and evil. After this text, which is to be copied from the book, Abū Bakr adds another few lines to be copied into the charm. These lines consist of a prayer and a supplication to God to help in the matter, in addition to some verses from the Koran which are reputed to this day in Muslim society to be highly effective against demons.³¹¹

Such a detailed formula for a charm, presented as a veterinary prescription to treat sick horses, is clear proof of the interrelation between folklore and professional medicine. As with general medicine, we see here that the penetration of such materials into veterinary medicine and their incorporation in the professional literature is accomplished in such a way as not to raise doubts among the veterinary writers who suggest their use.

Such folk materials, especially the use of charms and whispers, were not always accepted by the scholars and were sometimes rejected by learned doctors, who saw them as intolerable and certainly not to be included in scientific medical writings. A veterinary manuscript housed in Istanbul, which is a later copy of a Mamluk treatise from 1434 dedicated to the ruler of Aleppo, contains a reference to the treatment of horses suffering from

³¹⁰ *Ibid.*, pp. 413-415.

³¹¹ Among the short Suras that are often used for this purpose, we may note in particular the two called "*al-Mu'wadhatān*," meaning to protect the believer from evil and damage from demons. The first Sura, *al-Fātiḥah*, is also one of the most popular in this context. Another verse that was very popular was The Verse of the Throne—"*Āyat al-Kursī*," which describes the throne of God. See Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 415.

colic, one of the hardest illnesses to cure. The author writes that whispers and charms do not help in this case and the veterinarian will do better to rub oil on his hand and insert it into the horse's anus to clean out the faeces that have hardened there and blocked the passage. After the manual cleaning of the rectum, the writer recommends performing a cleansing enema using medical substances such as oil and rue—*sadhāb*,³¹² and afterwards a third enema using old wine mixed with oil and natron salt—*naṭrūn*. This Mamluk author also rejects the use of whispers and charms as treatment for rabies, testifying to scientific development and the primacy of medical practise over old traditions. He does indeed hint at the existence of magic methods in the veterinary literature, but declares that they are totally ineffective. This approach of a Mamluk writer appears to indicate a new departure in medical thinking and perception.³¹³

In respect of the integration of religious elements in medicine, it is worth mentioning Ibn Khaldūn's outspoken opposition to the method known as the Prophet's Medicine, which advocated the use of verses from the Koran and prayers as a major component in the treatment of diseases.³¹⁴

The medicine mentioned in religious tradition is of the (Bedouin) type. It is in no way part of the divine revelation. (Such medical matters) were merely (part of) Arab custom and happened to be mentioned in connection with the circumstances of the Prophet, like other things that were customary in his generation. They were not mentioned in order to imply that that particular way of practicing (medicine) is stipulated by the religious law. Muḥammad was sent to teach us the religious law. He was not sent to teach us medicine or any other ordinary matter.

The widespread use of chapters from the Koran and the attribution to them of magic powers to ward off the evil eye was certainly based on the Islamic heritage, which was present also in the *Adab* literature and other written

³¹² There are many species of rue- *sadhāb*, for example, a desert species, a mountainous one and a garden one. The garden species is what the Spanish call *rūṭah*, the desert species is *fījan* or *tāfasyā*. There is a saying "*al-ḥazā wa-al-zūfrā*" (equivalent to "birds of a feather flock together"). See Moshe Ben Maimon, *Medical works vol. V: Lexicography of drugs*, p. 80 [*sadhāb*: 279].

³¹³ *Kitāb al-zardaqaḥ fī ma'rīfat al-khayl wa-ajnasihā wa-amrāḍihā wa-adwiyatihā*, Topkape Sarāy, Istanbul, Ms. No. 4689; *Chevaux et cavaliers arabes*, p. 125. See also figure 47.

³¹⁴ Ibn Khaldūn [sic.], *The Muqaddimah: An Introduction to History*, Translated from the Arabic by Franz Rosenthal, Bollingen Series XLIII, 3 vols., New York: Pantheon Books, 1958, vol. III, p. 150.

sources, particularly treatises belonging to the genre of the Prophet's Medicine, which included many prescriptions of this kind.³¹⁵

Mamluk veterinarians used charms and whispers to treat animals, but these magic methods were mostly recommended as supplementary treatment. Presumably these methods were regularly practised among humans both for warding off the evil eye and for protection from various diseases. The principle of expelling or driving disease out of the body is a survivor from the past and the continuation of longstanding traditions that developed in Islamic medicine, whether human or animal. In the case of veterinarianism we are witness, above all, to the fact that it was a professional field in which conventional treatments based on medication were the dominant methods, in addition to classic techniques including dietary regimes, enemas, bloodletting, and cauterization, which were the basis of veterinary treatment. The resort to supernatural means such as charms and whispers using verses from the Koran occurred mostly in cases of diseases that were particularly hard to treat and only after conventional methods of treatment had failed to cure the disease, or as a sort of "preventive medicine." Abū Bakr's detailed description of charms and whispers, appears alongside methods belonging to the realm of scientific medicine, and this perhaps indicates the broad diffusion of magical expedients and their importance in treating animals.

³¹⁵ Ibn Qayyim al-Jawziyah, for example, in his book on the Prophet's Medicine, describes the extensive use of verses from the Koran according to the tradition of the Prophet. There is scarcely an illness in his book, from common illnesses such as fever, coughing, rheumatism, to mental illnesses and madness, which cannot be cured by reciting some verses from the Koran. He insists that the Koran is the cure and the medicine for every illness, whether psychological, which he calls illness of the heart, or physical illness that affects the organs of the body. The Koran is perceived as the cure for the troubles both of this world and the next. See Ibn Qayyim al-Jawziyah, *al-Ṭibb al-nabawī*, p. 272.

CHAPTER EIGHT

INVASIVE METHODS OF TREATMENT IN VETERINARY MEDICINE

It is impressive to discover in medieval medical treatises dealing with the treatment of animals such a rich description of invasive methods applied to resolve various infirmities. The existence of a great variety of surgical instrument serving this purpose attests to the existence of a professional practise.¹ The existence of such invasive methods raises serious problems, such as the reduction of pain, methods used to prevent animals from brisk movements during operations and the danger of infection. Not all these problems are clearly or directly addressed in the sources, but they have to be taken in consideration when dealing with these methods.

A. PHLEBOTOMY

Bloodletting was the most common form of medical treatment of humans in the Middle Ages. Three methods were used, each with a different name in Arabic. The first method was called *faṣḍ*,—drawing blood by surgical intervention. The surgeon opened one of the vessels and drew a measured but large quantity of blood. This was considered dangerous because of the difficulty involved in closing and sealing the vessel to stop the bleeding, therefore doctors tended to avoid this method. The second method, called *ḥijāmah*, was easier. The risk entailed was negligible because the blood was drawn by less violent means, such as cupping glasses or scratching the skin with a sharp knife, causing only superficial bleeding. The third method involved the use of leeches.² Larger quantities of blood could be drawn using *faṣḍ*, but *ḥijāmah* was the more conventional method, warmly recommended by doctors as a remedy for almost every illness, and also used as a prophylactic against injury or infection. The human doctors recommended bleeding for almost every illness. Even for anaemia,

¹ E. g. Abū Bakr, *Kāshif*, vol. II, pp. 143, 327, 329; al-Baladī, *al-Kāfi fi al-bayzarah*, p. 247; al-Malik al-Ashraf, *al-Mughnī fi al-bayṭarah*, pp. 56, 59, 73, 149, 159, 160; Anonymous, *al-Jawād al-‘arabī*, pp. 206, 207, 260, 263, 265, 295. Abū Bakr even includes sketches of surgical instruments. See Abū Bakr, *Kāshif*, vol. II, p. 187.

² Ibn Sīnā, *al-Qānūn fi al-ṭibb*, vol. I, book 1, pp. 299-307 (*fi al-faṣḍ*); pp. 309-310 (*fi al-ḥijāmah*); pp. 311-312 (*fi al-‘ilq*).

called “poverty of the blood,” the standard treatment was bloodletting. In most cases they turned to this method out of the general perception that drawing blood from the body was a healthy and even essential action for promoting the body’s speedy recovery from every illness.

Phlebotomy was also practised in veterinary medicine, following the rules governing human medicine. The practise of phlebotomy was based on the theory of the four humours, a theory that encompassed all animals, whether large like horses or small and delicate such as hunting birds. Hence we find that many writers of professional veterinary treatises restrict engagement in this field to those with proven expertise and knowledge of the animal’s blood system, including the names and precise location of the arteries and veins from which blood could be drawn. Most of the veterinary treatises devote a chapter to a detailed list of the blood vessels and their exact location in the body, explaining how to draw blood from them, when and in what circumstances it is permitted to do so, and stating what types of illnesses and medical conditions can be cured by phlebotomy.³ Al-Malik al-Ashraf recommends treating anaemia by drawing blood from the vessels that pass through the eye sockets, but he does not specify the amount of blood to be drawn, as he usually does. In this case the bloodletting is combined with the use of a smelling substance such as camphor and also a special dietary regime for seven days, a period estimated to guarantee the anemic horse’s recovery.⁴

Al-Şāhib Tāj al-Dīn, in a chapter entitled “The description of work with a needle,” explains how to use a needle for opening arteries to draw blood.⁵ He warns of the risks involved in puncturing a vessel, especially the danger of injuring the gullet, called the ‘water channel’, which is very close to the artery in the neck from which the surgeon intends to bleed. Tāj al-Dīn also explains how to prepare the horse for the bleeding procedure, tying its hindlegs and forelegs, gagging it and tying it in a special way to ensure maximum immobility during the procedure. Above all, he emphasizes the need for skill on the part of the practitioner, who should have gentle and nimble hands in order to carry out this procedure.

Abū Bakr al-Bayṭār describes the state of affairs concerning bleeding of horses in his times. He discusses bloodletting among animals in the theoretical framework of his book, listing the arteries and veins that can be

³ Al-Malik al-Ashraf, *al-Mughnī fi al-bayṭarah*, p. 161.

⁴ *Ibid.*, p. 64.

⁵ Al-Şāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, pp. 270-271.

bled.⁶ However, this is not sufficient proof of the prevalence of the method in veterinary medicine, especially in view of Abū Bakr's differentiation between the chapter describing the vessels appropriate for bleeding and the rest of the chapters, which he defines as "therapeutic." Moreover, elsewhere in the book where he refers to phlebotomy as treatment for illness it is not the sole treatment recommended, and usually appears in conjunction with other treatments, including various medications. One example: for treating swelling or inflammation of the urethras and bladder,⁷ Abū Bakr suggests first drawing a measured quantity of blood from the veins in the inner side of the hindleg (*baṭn al-rijl*), and then bandaging the swollen area (*al-unthayayn*) with a special dressing made of barley flour and *bāqillā* (broad bean) flour, kneaded together to form a dough and mixed with juice extracted from endive (*hindabā'*) and green hyssop. This appears to indicate that bloodletting was not considered adequate in itself. Indeed, we mostly find that it did not constitute the basis of the treatments prescribed, in contrast to its major role in human medicine, where it was even used as a preventive treatment.

In the veterinary literature, *faṣd* is almost the sole bloodletting method discussed, while the other two methods, *ḥijāmah* and leeches, are barely mentioned.⁸ The term *ḥijāmah* appears only once in Abū Bakr al-Bayṭār's book, where he discusses the use of bloodletting instruments for cutting the skin, but he doesn't mention even once the performance of *ḥijāmah* as a treatment for diseases of horses or other animals. The one instance where the term appears is when Abū Bakr relates that his father treated a disease called *baraṣ* (vitiligo)—a severe skin disease that is described in the Koran as one of the miracles of the Prophet ʿĪsā (Jesus), who cured those suffering from it. The treatment described by Abū Bakr includes the use of a cutting instrument or a special bloodletter's knife to cut or scratch the diseased part of the skin, and then applying burning substances such as onions or *andrānī* salt. In this case it is not clear whether he refers to treatment by *ḥijāmah* or some similar method.⁹ The avoidance of *ḥijāmah* may have resulted from the difficulty of scratching the skin of large animals like horses and the ineffectiveness of cupping glasses on their skin. Similarly,

⁶ *ʿfi maʿrifat mā fi al-faras min al-ʿurūq al-latī yufṣad bihā wa-ṣifat manshaʾihā min al-kabidʾ*: Abū Bakr al-Bayṭār, *Kāshif*, vol. I, pp. 117–123.

⁷ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 323.

⁸ Anonymous, *al-Jawād al-ʿarabī*, p. 221.

⁹ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 123.

the leeches' ability to suck blood through the animals' tough hide was limited.

On the use of leeches in veterinary medicine there is only one piece of evidence, in a treatise by an anonymous author (757/1356) who describes the treatment of a disease called *al-bāḍjinām*. He attributes this method to a veterinarian by the name of Abū Yūsūf, who suggested using many leeches, placing them on the diseased area so that they would fill themselves with the blood of the patient until they fell off. After this, he suggests massaging the area with medicaments such as salt, tar (*qaṭrān*), alum, and rose oil until the sores heal. The name of this disease does not appear in Abū Bakr's list in his comprehensive veterinary book, although it was apparently a skin disease that affected horses.¹⁰ Parenthetically, leeches are often mentioned in the veterinary sources as parasites that infiltrate the body, and one of the tasks of the veterinary surgeon was to remove them from the places they had colonized, especially the nasal cavity and nostrils, underneath the tongue, and even inside the gullet.¹¹ Presumably, the wish to avoid scratching the animal's skin was also related to the status of the horses discussed in the veterinary treatises, when every scratch or burn damaged the horse's clear skin, and even superficial bleeding was seen as a defect that lowered the horse's value and beauty. Perhaps it also derived from the veterinary surgeons' more pragmatic approach compared with doctors who treated humans, who were restricted by the principles of the classical theory of the four humours.

When it came to small and sensitive creatures like birds, bloodletting was liable to cause considerable damage, and even death, but this danger apparently did not deter those who specialized in birds, although many veterinary sources warn against this treatment, advising falconers to avoid bleeding hawks or falcons if at all possible, and resort to it only when there is no alternative. On the other hand, some writers declare that drawing blood from a vessel is the most effective form of treatment, especially if the blood is drawn from the main vessel which is situated under the armpit, on the base of the wing.¹²

The danger to the bird did not end with the cutting of the vessels; considerable skill was required to stem the bleeding after drawing the blood.

¹⁰ Anonymous, *al-Jawād al-ʿarabī*, p. 221.

¹¹ On treatment to remove "bad" leeches from various parts of the horse's body, see (from the nostrils and nose): Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 177; (from the oral cavity or throat): Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 189.

¹² Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 233.

Hunting treatises that describe the bloodletting technique include precise instructions for its performance, the location of the vessel and the estimated amount of blood to be drawn, generally a very small quantity measured in drops. The needle used for opening the artery or vein is described as a sharp delicate instrument that has to be kept clean, and after the bloodletting the site of the incision has to be washed with special substances such as vinegar, oil and salt.¹³ An example illustrating the complexity of phlebotomy appears in a book by al-Baladī, who recommends it for an illness that bends the falcon's wing feathers. He recommends bloodletting only after all the other options have failed, and only to be performed by a skilled doctor who is adept at locating the vessels to be bled. Al-Baladī's instructions include preparation of the area by washing it in warm water, using a clean needle especially designed for this purpose, and drawing a precisely measured quantity of ten drops of blood in the case of the illness mentioned, and even less in the treatment of other illnesses. To complete the procedure and prevent further bleeding, it was necessary to wash the area with cold water and then apply a mixture prepared in advance, consisting of vinegar, oil and salt, weighing two *dāniq* [an ancient coin = 1/6 *dirham*]. Al-Baladī even describes the piece of soft woolen cloth that had to be dipped in an antiseptic material and then pressed on the area of the bleed until it stopped completely. After the treatment, he writes, the surgeon has to give the bird complete rest in a dark place for seven days, during which he supplies the bird with rich food consisting of small pieces of good quality mutton.¹⁴

Apparently, this treatment was not such a routine matter among those who treated birds, as indicated by the fact that the writers discuss the danger involved.¹⁵ The writers state that those specializing in this method have to acquire experience by practicing on less highly valued hunting birds, before letting blood from a precious hawk.¹⁶ They particularly stress

¹³ Some veterinary treatises discuss the shape of the needle and its thickness. Falconry treatises describe bloodletting with a fine sharp-pointed needle or a feather designed specifically for the task. See al-Baladī, *al-Kāfi fi al-bayzarah*, p. 233. Veterinary books on horses also mention a sharp instrument that was used to open the arteries for the purpose of bloodletting. Al-Šāhib Tāj al-Dīn, for example, in a chapter entitled "Description of the use of the needle," recommends using a fine sharp-pointed needle. He describes the procedure in detail, explaining how to hold the needle, how to feel the animal's pulse and identify the location of the artery to be opened. See al-Šāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. I, pp. 270-271.

¹⁴ Al-Baladī, *al-Kāfi fi al-bayzarah*, pp. 299-300.

¹⁵ *Ibid.*, p. 233.

¹⁶ Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 238.

the danger of the *faṣd* method, saying that it is inadvisable to use this method of bloodletting frequently, as opposed to the common practise in human medicine.

B. CAUTERIZATION

According to Manfred Ullmann, the two most common methods in Islamic medicine were cupping and cauterization.¹⁷ Ibn Sīnā explains that the purpose of cauterization—burning the skin or the flesh—is to prevent hemorrhage or stop the flow of blood from the arteries and veins that have been cut. Another purpose is to dry the body that is diagnosed as “very moist” or flaccid. Cauterization was also used to heat a cold body or prevent the spread of diseases of a moist nature.¹⁸ In his, *al-Qānūn fī al-Ṭibb*, Ibn Sīnā explains that this method is used against skin growths or warts, fistulas (*nāṣūr*, pl. *nawāṣīr*), to prevent the spread of gangrene, strengthen the bodily system involved and restore its natural temperament, dissolve dead tissues adhering to the organ and arrest hemorrhage. Above all, he recommends cauterization for a severe form of leprosy (*judhām*), which he prescribes treating by numerous burns on various parts of the body, the head, throat, buttocks, wrists and ankles, the forehead, the area above the eyebrows, and the area of the spleen in the abdomen.¹⁹

According to Ibn Sīnā the best cauterizing instrument is a heated golden rod. The burn may be made on the outer layer of skin anywhere in the body, or internally in places like the inside of the mouth, the nostrils or the anus. In discussing the cauterization of internal areas, he explains precisely how to protect the adjacent area from inadvertent burning, using

¹⁷ Ullmann, *Islamic Medicine*, p. 4.

¹⁸ العِلُّ بِالْكَيِّ فِي اللَّحْمِ:

وَكُلُّ مَا تَكْوِيهِ الْأَبْدَانُ
وَمِنْ عُرُوقٍ بَرَّتْ كَبَارُ
وَفِي جُسُومٍ رَطْبَةً تَجْفِيفًا
وَكَيْ تَسْخَنَ جُسُومًا بَرَّدَتْ

فَهُوَ لِقَطْعِ الدَّمِ مِنَ الشَّرِيَانِ
أَعْيَا الطَّيِّبِ دَمَهُنَ الْجَارِي
وَفِي لَحُومٍ رَخْوَةً تَكْنِيفًا
وَتَمْنَعُ الْبَلَاتُ مَهْمَا اطَّرَدَتْ

See Ibn Sīnā, *al-Ūrjūzah fī al-ṭibb*, p. 192.

¹⁹ *Ibid.*; Ibn Sīnā, *al-Qānūn fī al-ṭibb*, vol. I, book 1, p. 325, vol. 3, book 4, p. 2011 (*nawāṣīr*); p. 2236 (*‘ilāj al-tha’ālil*); p. 2023 (*fasād al-‘aẓm*); p. 1946 (*al-saraṭān ‘ilājuhu al-ḥadīd*). Regarding cauterization on the head, he writes that it is necessary to burn the scalp through to the skull bones, even causing peeling of the bone due to the heat of the white-hot iron. But at the same time, the doctor must take care not to damage the brain itself. Ibn Sīnā warns against ignorant people who are negligent in their use of cauterization and are liable to kill the patient. See *Ibid.*, vol. 3, book 4, pp. 1956-1957.

protective means such as bandages soaked in cooling liquids.²⁰ Ibn Sīnā's explanations are echoed in later medical treatises. For example, al-Zahrāwī's book on medical practise features an extensive description of cauterization methods, running to 56 sections, along with a fairly detailed description of the instruments used for cauterization.²¹ The wide diffusion of this practise, perhaps even more widespread than phlebotomy, is reflected in all of the treatises that refer to the Islamic medical heritage, known as "the Prophet's medicine."²²

In veterinary medicine, too, there is barely a treatise that does not suggest cauterization for curing animals' diseases. However, in many cases cauterization is only used as a supplement to other treatments, largely consisting of various kinds of medicaments.²³ Several treatises, particularly that of Abū Bakr, not only describe the recommended methods but also present them in order of effectiveness.²⁴ Some treatments include various patterns of burns on different parts of the animal's body, with each pattern constituting a treatment in its own right rather than one that comes to supplement another method. A glance at these patterns, mostly de-

²⁰ Ibn Sīnā, *al-Qānūn fī al-ṭibb*, vol. I, book 1, p. 325.

²¹ Khalaf b. al-'Abbās abū al-Qāsim al-Zahrāwī (d. 1031 CE), *al-Maqālah al-thalāthūn fī al-'amal bi-al-yad min al-kay wa-al-shaqq wa-al-baṭṭ min kitāb: al-Taṣrif li-man 'ajiza 'an al-ta'rif*, facsimile edition of a manuscript, published with Russian translation by Ḍyā' al-Dīn b. Musā Bunyātuv, Moscow: Dār al-'Ilm, 1983; See also 'Alī b. al-'Abbās al-Ahwāzī (d. 384 H/994 CE), *al-Kiḥālāh (ṭibb al-uyūn)*, fī Kitāb Kāmil al-ṣinā'ah al-ṭibbīyah al-ma'rūf bi-al-Malakī, eds. Muḥammad Zāfir al-Wafā'ī and Muḥammad Rawās Qal'ah-jī, Damascus: Silsilat al-Turāth al-Ṭibbī ('Ilm al-Kiḥālāh-10), 1997, p. 162.

²² One of the famous sayings attributed to the Prophet Muḥammad recommends three types of treatment: giving the patient honey to drink, drawing a little blood by *ḥijāmāh* (cupping), and cauterization "شربة عسل، وشرطة محجم، وكية نار، وأنا نهى أمتي عن الكي" See Ibn Qayyim al-Jawziyyah, *al-Ṭibb al-nabawī*, pp. 38-40. Despite the severity of these methods and the explicit instruction to cauterize only when all other methods have failed, it appears that this was the most prevalent method of treatment among various groups in Muslim society. A contemporary anthropological study conducted in the United Arab Emirates and Kuwait has revealed that over 70% of the young women opted for cauterization, while only 50% turned to phlebotomy. Cauterization is used on children in cases of constant crying, as protection against the evil eye, fever, backache, stomach ache, and more. Bloodletting was used for severe headaches, stings and bites of venomous animals, and for rheumatic pains. The percentage of young women applying for the use of charms and whispers was 55%, as opposed to 75% of women from the older generation. See Abdul Raḥmān Msaiger and Amna al-Bairaq, "Folk Medicine for Child and Mother Diseases," *al-Ma'thūrāt al-Sha'biyyah* (Number 42, April 1996), p. 77.

²³ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 161, 163 etc.; al-Baladī, *al-Kāfi fī al-bayṭarah*, pp. 242, 244, 246 etc.; al-Ṣāhib Taj al-Dīn, *Kitāb al-Bayṭarah*, vol. II, pp. 213, 214, 282, 297, 298, 302, 311 etc.; Anonymous, *al-Jawād al-'arabī*, pp. 153, 159-161, 168, 179, etc.

²⁴ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 161, 163, 213, 219, 221, 229, 233, 235, 237, 241, 245, 247, 251, 261, 265, 281, 283, 285, 337, 357, 367, etc.

picted graphically in the manuscripts, reveals that the burns are basically in the form of geometric shapes composed of straight or curved lines, rectangles, circles, triangles and squares.²⁵ Some of the patterns resemble the brands burnt on horses and other animals for the purpose of identification.

Most of the treatments suggested by Abū Bakr al-Bayṭār for curing illnesses that affect horses' muscles or nerves include cauterization with a white-hot iron. He ascribes great importance to the shape of the burn and its location on the body, instructing the practitioner to use the utmost care not to hurt sensitive places, and above all to avoid causing chronic damage with the searing iron, such as damage to a nerve or to major blood vessels. Generally, the cauterization was external and designed to warm the area, perceived today as a way of neutralizing the neuromotor system and thus preventing pain in the particular muscle. We may assume that the patterns in Abū Bakr's book are those that were used by veterinary surgeons of his time and some of them also in earlier periods.²⁶

To illustrate the broad use of cauterization on horses, presented below is a list of the 47 illnesses (out of 214 illnesses that attack horses) for which Abū Bakr recommends this method (though we should bear in mind that for the most part he suggests it as a supplement to other medications). It includes the manner of administering the treatment, a description of the pattern of the burn, and the recommended degree of burning. Most of these treatments concern skin diseases.

1. *Al-Ḥardūn* (the lizard disease), a kind of skin growth. Abū Bakr suggests light cauterization after removal of the growth. He uses the term *ʿyuladdighu* (or *yaldhaʿu*) *bi-raʿsi al-mikwāt*, which means cauterizing the skin lightly with the point of the heated instrument.²⁷

²⁵ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 401. In various manuscripts of Abū Bakr's treatise, the copiers sketched the different patterns of the burns described by the original author. The same patterns appeared in the Arabic veterinary treatises, including falconry books. The authors displayed the pattern of the burn together with the relevant text explaining what disease it was designed to cure. In a manuscript from 1471, housed in the National Library of France, Paris, the patterns are depicted twice, once for each time that the specific burn is recommended for a certain disease, and the second time when the author assembles all the patterns together in a separate chapter in order to help the reader to choose the suitable pattern for the illness he wants to treat. See B.N., *Ms. Arabe* 283, fols. 99v°, 105r°, 105v°, 106r°, 109r°, 109v°, 110v°, 113r°, 114r°, 117v°, 120v°, 121r°, 129v°, 142v°, 143r°. See also figures 15 a-b.

²⁶ On the various patterns of burns, see, for example, Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 261, 265, 267, 281, 301, 303, 337, 401 etc. See various shapes of burns in figures 15 a-b.

²⁷ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 139, 221.

2. *Uzayraq* (blue eyewater), an eye disease. For this he suggests cauterizing one spot in the area above the eye, the *nuqrah*.²⁸

3. *Riḥ al-sabal* (Corneal Pannus—a kind of superficial keratitis), another eye disease. The treatment is similar to the above. The purpose of this cauterization is to cause the eyelid to open.²⁹

4. An eye disease called *al-ṣarāṣīr* (black-beetle, cockroaches, roaches). Light cauterization is recommended.³⁰

5. *Al-Zafarah* (pterygium). In this case Abū Bakr suggests using a variety of kohl that sears and cauterizes the surgical wound that is formed after surgical removal of the membrane that covers the eye (the conjunctiva?).³¹

6. *Al-ʿAnkabūtah* (nasal polyps), a tumorous growth in the nose. The treatment for this is surgical removal of the growth that has developed inside the nasal cavity, obstructing normal breathing and causing a foul smelling secretion from the nose. The surgical incision is made with a cauterizing instrument.³²

7. Madness and rabies. Here the author recommends a drastic surgical procedure to cut out the tongue, using a sharp pre-heated instrument which he defines as a cautery, emphasizing that it is forbidden to use a regular knife such as those used for other operations. Presumably the use of a heated instrument for cutting was recommended in the case of an organ that was liable to bleed profusely, because a heated instrument could arrest the bleeding immediately (similarly to laser cauterization performed today during various surgical operations). Abū Bakr states that excision of a horse's tongue does not detract from its ability to eat or to neigh.³³

8. *Khuld*—the 'mole disease' (in the sense of the animal, not the naevus), a leprous skin disease. According to veterinary writers, it may attack various parts of the body, such as the head (*khuld al-rā's*), the chest (*khuld al-ṣadr*), or the legs (*khuld al-rijl*). In all three cases the treatment consisted of surgery to remove the skin growth. In the case of the *khuld al-rā's*, Abū Bakr warns of the danger of removing a growth underneath the low-

²⁸ *Ibid.*, p. 161.

²⁹ *Ibid.*, p. 163. It is worth noting that Abū Bakr forbids using the *faṣd* method of bloodletting for this disease, while he recommends it rather than cauterization for another eye disease, called *ramad*—ophthalmia.

³⁰ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 165.

³¹ *Ibid.*, pp. 165-167.

³² *Ibid.*, p. 175.

³³ *Ibid.*, p. 187.

er jaw close to the throat, due to the possibility of damaging one of the major arteries that pass through the neck, causing immediate death. This operation is supplemented by cauterization, and the burn may be made in the shape of a ladder, as depicted in Abū Bakr's book.³⁴

9. *Su'āl* (Coughs). The author enumerates three different kinds of coughs. The first is caused by cold, and the treatment for it is herbal medicines together with cauterization of two spots on the sides of the neck. The second kind of cough is caused by heat and cauterization is not the appropriate treatment. The third kind, which results from an illness originating in an internal wound or inflammation of a lung, is treated by cauterizing two small spots in the region of the throat. In this case, cauterization is the first stage, and the subsequent treatment consists largely of medication.³⁵

10. Vomiting. The treatment prescribed is cauterization in the area of the navel, using two iron rods (*maṭraqayn*) to make two burns.³⁶ Vomiting was also treated by bloodletting and various types of antiemetic medicines and food.

11. *Al-Lawqah* (facial paralysis). The treatment includes four lateral burns across the nose of the sick horse, together with the use of smelling substances and phlebotomy.³⁷

12. *Al-Qaṣar* (cervical tetanus), inability to move due to a pulled muscle, especially in the region of the neck. The treatment prescribed is cauterization at the root of the tail, in the middle of the neck, and at the base of the neck. As in many other cases, Abū Bakr recommends cauterization as the last resort after all kinds of medications such as creams, aromatic substances, incense and heating have failed to solve the problem.³⁸ For a condition called *tashannuj*, a muscular contraction similar to *al-qaṣar*, he emphasizes that cauterization is not enough and suggests remedies such as warming the tender area and offering the animal smelling substances and warming foods like those suggested for *al-qaṣar*.³⁹

13. *Shazā* (splinter). Damage to the shoulder. It mostly affects mules and donkeys that work as pack animals, because of the heavy burdens

³⁴ *Ibid.*, p. 207 (*khuld al-rā's*); p. 241 (*khuld al-ṣadr*); p. 299 (*khuld al-rijl*); See also B.N., Ms. Arabe 2813, fol. 97r^o. For the surgical operation see below section E-4 (surgical treatment of khuld in the area of head).

³⁵ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 213-215.

³⁶ *Ibid.*, p. 215.

³⁷ *Ibid.*, p. 217.

³⁸ *Ibid.*, p. 219.

³⁹ *Ibid.*, p. 221.

they carry on their backs, causing injury to the shoulder area and attrition without fracture or dislocation of the joint. Abū Bakr emphasizes that this condition is as painful as a broken bone in humans.⁴⁰ He recommends applying bandages similar to those used for fractures or dislocation. He also remarks that those who err in diagnosing this illness choose to cauterize the shoulder area in a dotted triangular pattern.⁴¹

14. *Nakb*, or *mankab*—dislocation of the shoulder joint (*humerus*). For this Abū Bakr recommends the same treatment as for *shaḡā*, and if all the methods of bandaging do not work, he suggests a sun-shaped cauterization in the shoulder area.⁴²

15. A deep cut in the shoulder area, with the flesh partly torn away. The treatment includes bandaging with healing substances to close the wound, and as a last resort Abū Bakr suggests the sun-shaped cauterization mentioned above.⁴³

16. Dislocation or sprain of the elbow. In this case, too, the last option suggested by the author is cauterization. He explains that this method should be used only after 30 days of intensive treatment with all kinds of special dressings soaked in healing medications to help repair the joint. The three patterns of cauterization that he suggests in this context are *ṭāriqah*, a straight line burned with a straight iron rod, *nakhlah*, a palm tree shape, and *shamsah*, a sun shape.⁴⁴

17. Fractures. In the case of broken bones, the veterinary surgeons turned to cauterization only after binding and immobilizing the area of the break over a period of 40 days. Abū Bakr lists the kinds of fractures that can be treated and healed, as well as breaks in certain places which he declares incurable.⁴⁵

18. *Al-Kark*, erosion of the cartilage in a joint. Abū Bakr suggests using a white-hot iron rod to pierce the joint and make a hole inside the 'head of a joint' that has swollen due to excess food in the body. This treatment is one of many, including bandaging, immersion in cold water, opening the area with the tip of a sharp heated cautery, and applying creams.⁴⁶

⁴⁰ *Ibid.*, p. 43.

⁴¹ *Ibid.*, p. 227; See figures 15 a-b, showing various patterns of burns in veterinary use, two of them in the form of dotted triangles.

⁴² *Ibid.*, p. 229. See shape of *shamsah* in figure 15-a.

⁴³ *Ibid.*, p. 233.

⁴⁴ *Ibid.*, p. 235.

⁴⁵ *Ibid.*, p. 237.

⁴⁶ *Ibid.*, p. 239.

19. *Di'bat al-ṣadr* ('she-wolf of the chest')—A skin disease that affects the chest. Abū Bakr warns against cauterization as recommended by the ancients, explaining that it might be fatal because the disease is caused by heat emanating from the fire element in the body. The damage to the chest and its proximity to the heart call for cooling and soothing substances rather than heating and burning. He adds that he himself has seen horses die due to incorrect treatment of this disease.⁴⁷

20. *Huṭām fī al-rukbah*, a bone tumour of the knee. Abū Bakr suggests only one treatment for this problem, declaring that only lateral cauterization of the knee area in a *tirāz* embroidery pattern can cure this illness.⁴⁸ In this case he leaves it to the veterinary surgeon to choose the pattern of the burn, but the choice is limited to the repertoire of *tirāz* embroidery which he describes in the book.⁴⁹

21. *Al-kawn*, a round bony growth in the area of the knee, causing difficulty in bending the knee. Abū Bakr claims that the only effective treatment for this problem is cauterization in a pattern which is shown in the book.⁵⁰

22. *Al-Mashash*, a chronic illness that might disturb the horse's walking because of damage to a muscle in the knee area in the foreleg. As a last resort, Abū Bakr suggests cauterization in a special pattern described in his book.⁵¹

23. *Al-Inṣibābah*, injury to a nerve in the knee area, with an internal abscess (infiltration). Abū Bakr declares that he has tried various kinds of treatment, including creams, bandages, massage with oils, and bandages (*al-lazqah*). In this case he discourages the use of cauterization, having witnessed treatment administered by "one of the Turks," who used burnt cloth (*libād*) instead of a heated iron after drawing blood from the area had proved ineffective.⁵²

⁴⁷ *Ibid.*, pp. 241-243.

⁴⁸ *Ibid.*, p. 245.

⁴⁹ See the patterns that appear in Abū Bakr's book: *ibid.*, pp. 281, 401. See also *tirāz* patterns in figure 15-b.

⁵⁰ *Ibid.*, p. 247.

⁵¹ In discussing this disease Abū Bakr refers to a hard, dry growth that develops adjacent to the knee muscles, remarking that it affects mainly mules and pack animals. This growth leads to chronic illness and to weakening and numbness of the muscle. He describes it as a very severe disease that is liable to damage the leg muscles. *Ibid.*, pp. 53, 249-251. See also Housni Alkhateeb-Shehada, "Donkeys and mules," *Al-Masāq*, pp. 207-214.

⁵² Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 253.

24. *Al-Shazā*, frayed tendon. For this problem, Abū Bakr suggests cauterization by the *raqm* method, similar to that prescribed for *al-mashash*.⁵³

25. *ʿAzm al-Sabaq*, a bony tumour on the elbow, treated only by cauterization in special patterns as described in the book.⁵⁴

26. *Taqrīn*, similar to *sabaq*, this time a growth of the ankle bone, which penetrates the hoof. Cauterization in a special pattern is considered the only effective cure for this condition.⁵⁵

27. *Qurūḥ shahdīyah*, sores on the feet and hands. The treatment consists of cauterization with copper instruments, and the author cautions against the use of iron instruments for treating this condition.⁵⁶ This teaches us that cauterizing instruments were made of different materials.

28. *Sarṭān*, another bony outgrowth (tumour), this time at the pastern (*rusgh*) bone. The only treatment prescribed is cauterization in a broad arch pattern.⁵⁷ Abū Bakr compares this to *jard* and *taqrīn*, also defined as osseous growths and treated with cauterization.⁵⁸

29. *Taḥrīk al-fuṣūṣ*, dislocation of metacarpus bones. Cauterization in a pattern similar to that recommended for *sarṭān* is advised, but only after attempting to relocate the bones and splinting the area to immobilize it for a long period.⁵⁹

30. *Samjūn*. Most probably, a skin disease affecting the horse's hooves, whose main symptom is the appearance of pus in this part of the body. The recommended treatment includes repeated application of sheep tail's fat, and if that would prove ineffective—cauterization. Abū Bakr suggests that the veterinary surgeon choose a suitable pattern of burn from the selection depicted in his book.⁶⁰

31. Narrow hoof. In order to widen the hoof, the author describes a complex surgical treatment lasting 40 days, during which the surgeon attempts to induce the shedding of the horse's natural narrow hoof and the growth of a new, broader one in its place. During this period the veterinary surgeon has to change the bandages and rub various medicaments on the foot every four days. The treatment begins with the performance of five

⁵³ *Ibid.*, p. 257.

⁵⁴ *Ibid.*, p. 261.

⁵⁵ *Ibid.*

⁵⁶ *Ibid.*, p. 265.

⁵⁷ *Ibid.*

⁵⁸ *Ibid.*, p. 59 [*taqrīn*]; p. 57 [*jard*]; see also p. 65.

⁵⁹ *Ibid.*, p. 267.

⁶⁰ *Ibid.*, p. 269.

maṭāriq burns (with a heated iron cautery) in a lengthwise pattern along the external perimeter of the hoof.⁶¹

32. *Jarad*, a growth on the hock bone (*ʿurqūb*) of the hindleg. The only treatment recommended for this is cauterization in a *tirāz* pattern.⁶²

33. *Naḥkh*, a soft tumour in the hock causing the horse to limp. As a last resort, Abū Bakr suggests cauterizing, using patterns such as a net, a palm tree, or *tirāz*.⁶³

34. *Malaḥ*, another sort of tumour in the hock. It is treated with cauterization in a palm tree pattern.⁶⁴

35. Abū Bakr describes *khuld* in the leg as the hardest to cure of all the *khuld* growths. He recommends surgery to open the area and attempt to remove the growth, followed by internal cauterization of the surgical wound and also cauterization in a ladder pattern on the thigh, the abdomen, the leg, and any other place where the *khuld* has spread.⁶⁵

36. Dislocation of the coxofemoral joint (*maḥṣal al-ṣayyār*). The initial treatment suggested is relocation of the joint and immobilizing it with adhesive bandages containing well-heated tar. Abū Bakr describes the method that he learnt from his father. After a series of procedures including bandaging, splinting, binding, and pulling the shackled horse (*shikāl*) from the healthy side during two weeks, he describes the sun-shaped cauterization that his father performed on the joint.⁶⁶

37. Dislocation of the tibiofemoral joint (*maḥṣal al-sabaq*). The sun-shaped cauterization recommended here is similar to the treatment mentioned for dislocation of the coxofemoral joint, the only difference being that in this case the surgeon does not relocate the joint but merely binds it tightly with a bandage called *lazqah*.⁶⁷

38. *Al-Khaṭl*, slack leg tendon (*watar al-rijl*). Like the two previous dislocations, is treated by cauterization in a pattern described in the book. Abū Bakr remarks that an adhesive bandage (*lazqah*) in this area is unsightly and moreover, ineffective.⁶⁸

⁶¹ *Ibid.*, p. 271.

⁶² In this case, too, Abū Bakr invites the practitioner to choose the *tirāz* pattern from the selection of shapes that he describes in his book. See *Ibid.*, pp. 65, 281, 401.

⁶³ *Ibid.*, p. 65, 283.

⁶⁴ *Ibid.*, p. 285.

⁶⁵ *Ibid.*, p. 299.

⁶⁶ *Ibid.*, p. 301.

⁶⁷ *Ibid.*, p. 303.

⁶⁸ *Ibid.*, p. 303.

39. *Al-Iqāl* (fetter, shackle), an illness caused by bending, damaging an artery in the inner thigh and impeding the horse's gait. The treatment suggested includes bloodletting, cauterization with a white-hot iron and massage with various creams. Abū Bakr describes the cauterization to be performed, stating that three burns should be administered in the form of horizontal lines in the area called *al-qanāt*.⁶⁹

40. *Al-Bajal* (leucorrhea), discharge of white mucous material from the vagina, an indication of infection. This disease is described as one of the worst illnesses that attack horses. To treat it, Abū Bakr suggests a prescription which he himself used, including suppositories made of a natron (*naṭrūn*), of the weight of one *mithqāl* per day, as well as foods suitable for the season of the year. He also mentions cauterization, but describes it as a method used by other veterinary surgeons, who, according to him, cauterize every joint in the horse's body. He refers to the case of one practitioner, whose name he does not mention, who heated an iron rod and inserted it in the base of the tail in the direction of the buttocks to a depth of one span of the hand (*shibr*).⁷⁰

41. Castration: the instrument used for cauterizing was also used for castration. This was sharp heated instrument called *mikwāt*, which Abū Bakr describes as essential for performing the types of castration that he lists in a special section on the subject.⁷¹

42. *Al-Inḥilāl* (weakness of the loins), a severe disease that upsets the horse's balance, making it difficult for him to walk or even stand because it affects his bone structure. Abū Bakr describes this as the gravest of the three illnesses that affect the skeleton.⁷² This is reflected in the special methods of treatment, which include binding the whole body with tar bandages for seven consecutive days and then repeating the process, hanging the horse, spraying hot oil over the body, and more. If all of these methods prove futile, the author suggests cauterizing in different patterns on various parts of the body.⁷³

43. Diaphragmatic hernia—*Inḥitāq fi al-baṭn*. In this kind of hernia part of the intestines protrudes through the diaphragm from the abdominal cavity. The treatment includes the use of substances described as soldering materials, such as cypress nuts, gall nuts, pomegranate flowers, and a

⁶⁹ *Ibid.*, p. 305.

⁷⁰ *Ibid.*, p. 315.

⁷¹ Details of the various methods of castration appear in the last section of this chapter. On the use of the sharp cautery for the *mikwāt* operation, see *ibid.*, p. 327.

⁷² *Ibid.*, p. 81.

⁷³ *Ibid.*, p. 337.

certain kind of leek. These ingredients are mixed together in equal quantities and added to fish glue, a gelatin made from fish bones and skin. The mixture is spread on strips of cloth to bandage the area of the hernia. In this context the writer distinguishes between colts and adult horses. This kind of hernia in colts was not seen as a very serious problem because there was a good chance that it would close by itself as the horse grew, sparing the need for surgery. By contrast, a hernia that developed in an adult horse called for thorough treatment, including extensive cauterization along the hernia and around it. Even if this treatment did not hermetically seal the opening, it enabled the horse to function almost as usual, according to the writer.⁷⁴

44. *Al-Maghal* (horse colic). This condition, explained as trapping of air in the blind intestine (caecum), was considered a very serious illness that might even prove fatal. The veterinary surgeons distinguished between two levels of severity. An animal suffering from the disease at a milder level could pass stools, while the more severe level caused blockage of the bowels and also urinary retention. The treatment suggested by Abū Bakr includes suppositories made from various substances, liquids to drink, purging enemas, bloodletting and cauterization. Regarding the latter, he states that it should be done in the area of the navel in the shape of two straight lines during an attack of pain.⁷⁵

45. *Al-Khanān al-raṭb* (moist *khanān*—humid cachexia). Abū Bakr states that this illness, known in his time as *al-khuld al-ṭayyār* (erratic *khuld*), resembles the other types of *khuld* mentioned in his book, but while these other types affect certain parts of the body, such as the head, chest and legs, this disease spreads through the whole body. Explaining that it originates in black bile that affects the liver and the spleen, he compares it to the disease of phlegm that affects humans. His theoretical explanation includes the names of the organs that drain excess humours from the body. For example, the function of the gall bladder is to collect surplus yellow bile, the liver's function is to collect surplus blood, and the spleen's function is to collect black bile. According to this explanation, there is no specific organ whose function is to collect surplus phlegm (white humour), therefore this humour spreads throughout the body. Consequently, cauterization as treatment for diseases originating in phlegm has to be performed in many different parts of the body. Among these, Abū Bakr mentions a circle around the forehead and under the

⁷⁴ *Ibid.*, p. 347.

⁷⁵ *Ibid.*, pp. 355-357.

mane up to the base of the ears, three spots on the middle of the head, three horizontal lines in the area of the navel, some burns at the back of the thighs and below the anus. The purpose of all these burns is to dry the excess humours in the body, but, as in most other cases, cauterization is suggested as a supplementary to other treatments based on medication and diet.⁷⁶

46. *Lazaz*, depression or distress that overcomes the animal due to exhaustion, oppressive heat or intense exertion. Here, too, Abū Bakr recommends cauterization—in the area of the navel and loins—only as a supplement to medicines, potions, creams, and even swimming in cold water.⁷⁷

47. A disease defined as “kidney pains” (*wajaʿ al-kilyatayn*—nephritis). For treating this, Abū Bakr refers to the methods of the ancients, who performed a long list of burns on the skin in the area of the kidneys. He mentions 24 lines made by white-hot iron rods on the animal’s skin, 12 on each side.⁷⁸

To draw a comparison with Abū Bakr, al-Malik al-Ashraf’s treatise mentions in different parts of his work 22 types of illnesses that can be treated by cauterization. These include the entire gamut of illnesses, internal and external, from broken bones to hair growth.⁷⁹

In his chapter discussing methods of cauterization, Abū Bakr graphically describes the patterns,⁸⁰ particularly geometrical shapes to be marked on the animal’s skin, which generally match the shape of the body part to be cauterized. Based on the descriptions of the patterns that appear in various veterinary sources, they can be divided into the following six categories:

1. Circular patterns, usually decorative, called *shamsah*, from the word *shams*, meaning sun.

⁷⁶ *Ibid.*, pp. 365–367.

⁷⁷ *Ibid.*, p. 371 (Swimming as a treatment for illnesses is discussed later in this section and in Chapter VII, section A-5).

⁷⁸ *Ibid.*, p. 373.

⁷⁹ Al-Malik al-Ashraf, *al-Mughnī fī al-bayṭarah*, pp. 59 (*jard ʿadhmī*), 61 (*khanān*), 76–77 (*saraṭān*), 78–79 (*khuld ṭayār*), 80–82 (*tark wa-khalʿ wa-ʿaraj wa-ʿasf fī al-rijl*), 83 (*inḥilāl al-kifl*), 90 (*kazāz*), 91 (*al-qaṣar*), 93–94 (*al-naḥākh wa-riyāḥ al-taqṭī*), 97 (*hubūb fī wajh al-faras*), 99 (*al-shaḥāh*), 108 (*al-takhashshub*), 111 (*bayt al-sabaq*), 112 (*marad al-nisā*), 113 (*al-salaʿ*), 117 (*al-shaqāwāt*), 123 (*al-ḥirzātayn wa-al-shāmatayn*), 127 (*al-dhiʿbah*), 128 (*al-thūthah*), 129 (*hubūb fī ʿayn al-faras*), 147 (*inqilāb al-ḥāfir*), 156 (*fī maʿrifat mā yunbitu al-shaʿr*).

⁸⁰ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 401.

2. Elongated rectangular shapes containing horizontal lines, described as ladder—*sullam*.
3. A special shape called a palm tree, *nakhlah* in Arabic, due its resemblance to the trunk of a palm tree.
4. Simple patterns of straight lines marked by rods of heated iron—*maṭraqah* (*maṭāriq* pl.), from the verb *ṭaraqa*—to strike.
5. Simple circular shapes, called *ḥalqah*.
6. Arrow-shaped patterns or curved lines—*sahm*.

The degree of burning was also taken into consideration in this method of treatment. Generally, three different terms were used to define the degree of burning: *jazz*, *tashṭīb* and *raqm*—singeing with a white-hot iron, affecting only the outer layer of skin.⁸¹ Sometimes we find terms related to types of burns on specific body parts, for example, a circular burn in the hoof area that also touches the *ashʿar* is called *taʿzīb*.⁸² Special cauterizing instruments were used according to the type of illness and the degree of burn required. These included straight iron rods—*miṭraq* (pl. *maṭāriq*), *marqam* (pl. *marāqim*), *mikwāh*, *sikh al-mikwāh*, a sharp instrument used mainly for cutting, and *mibḍaʿah*, a kind of metal scalpel or dissecting knife.⁸³

The Yemenite king al-Malik al-Ashraf, in his *al-Mughnī fī al-bayṭarah*, describes the widespread use of cauterization, and in many cases he suggests using a method that was apparently more common in Yemen than in other areas of Mamlūk influence. Similarly, al-Malik al-Mujāhid, who belonged to the same Rasūlī dynasty, suggests numerous treatments by cauterization, describing the form of each one. A unique feature of the Yemenite authors is their dedication of special chapters to the treatment of animals which are barely mentioned other veterinary treatises also appear in al-Malik al-Mujāhid's discussion on cauterization. With mules, the recommend methods similar to those used on horses.⁸⁴ With donkeys, al-Malik al-Ashraf suggests cauterizing in the case of *al-kuzāz* (tetanus), which causes difficulty in walking and clumsiness due to swelling in the head and neck (apparently caused by internal infection).⁸⁵ The same author devotes a chapter of his book to camels' diseases, and interestingly enough, he refers to cauterization only in relation to non-noble camels. Apparently

⁸¹ Anonymous, *al-Jawād al-ʿarabī*, p. 159.

⁸² *Ibid.*, p. 179.

⁸³ *Ibid.*, pp. 159, 168, 179; Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 239, 283, 305, 315, 327, 337, etc.

⁸⁴ Al-Malik al-Ashraf, *al-Mughnī fī al-bayṭarah*, p. 165.

⁸⁵ *Ibid.*, pp. 89, 168.

the veterinary surgeons avoided burning the skin of camels that were considered to be noble. Cauterization is also recommended for farm animals. Cows, for example, had to be treated by cauterization in the case of swellings on the body (*waram*—tumour).⁸⁶ Cows and camels suffering from *al-nufākh* (gastric flatulence), which caused swelling of the stomach, apparently as a result of eating certain plants, were likewise treated by cauterization.⁸⁷ Cauterization was also used on sheep and goats suffering from certain diseases.⁸⁸

We have seen that Abū Bakr lists 47 diseases for which cauterization is a possible treatment, yet in several cases he refers to this method in order to warn against it while actually criticizing those who use it for certain illnesses. Even when he recommends it, he does so with the reservation that it is only one part of a whole scheme of treatment, based mainly on various medications. In contrast, the two Yemenite authors express no criticism of cauterization but rather recommend it warmly. We may assume that this approach was rooted in an ancient tradition that prevailed throughout Yemen and the Arabian Peninsula and profoundly influenced the veterinary books written in the region during the Mamlūk period. Perhaps its sources were in folk medicine, which was deeply rooted in these areas and left its stamp on methods of treatment that exist to this day.⁸⁹ And perhaps it stemmed from ignorance regarding many diseases of camels and the other animals discussed in their treatises, leading them to perceive cauterization, like bloodletting, as a reliable remedy for every ailment. Another possible reason for the prevalence of cauterization in those regions was that it required no technological sophistication and consisted simply of heating an iron (or other metal) rod and burning the skin of the animal (or human).⁹⁰ A further explanation may be the sparse vegetation in Yemen's hot dry climate, while plants constituted an important base for the preparation of medicines and for pharmacological development in Syria and Egypt.

⁸⁶ *Ibid.*, p. 214.

⁸⁷ *Ibid.*, p. 215.

⁸⁸ *Ibid.*, pp. 216–219.

⁸⁹ On methods of treating camels today, see Claus, "Camel Diseases," pp. 7–25.

⁹⁰ A simple anthropological explanation for the wide use of cauterization among the Bedouin tribes in the Arabian peninsula and the Persian Gulf is related to the Bedouin lifestyle. A fire for preparing tea and coffee was customarily to be found in a Bedouin tent, and instruments used for cauterization could be placed on the grill. Thus, heated instruments were readily available and often used in treating humans. See 'Alī Makkawī, "treatment by Medicine Herbs in Qatar," *al-Ma'thūrāt al-Sha'biyyah*, Number XXXXII (April 1996), pp. 49–69.

Cauterization was also in broad use for treating hunting birds, but, much like phlebotomy, usually only after milder forms of treatment, such as dietary regimes or medications, had failed. Cauterizing parts of a bird's body was performed with the greatest caution, and the surgeons attempted to do no more than one burn at a time. If it was considered necessary to cauterize areas on both sides of the body, they waited at least three days until the first burn had healed and only then did they cauterize on the other side. Most of the sources emphasize that in the case of hunting birds the treatment continued after the cauterization and included massaging the area with anti-inflammatory substances, the prescriptions for which appear in the treatises.⁹¹

The veterinary authors of hawking and falconry treatises suggest cauterization for falcons and other hunting birds suffering from a disease characterized by blockage of the nose or a runny nose, defined as 'winter cold' but only after attempting to cure it with medications and other remedies such as warming the falcon's body by placing it in the sun for a few hours. The procedure to be followed in this case is to make one burn in the right nostril and wait for three days until the scar tissue drops off, and then cauterize the left nostril. After this, another burn has to be performed on the head.⁹² There were other methods of cauterization that were considered more gentle and made a lighter burn on the bird's body, for example, burning with fragrant wooden sticks, a method described in the sources as effective for treating *al-aklah* disease. The stick, taken from the artemisia bush, was used to burn both sides of the beak. A different method was to drip hot oil on the area to be treated. Another prescription, suggested by a Frankish falconer who is mentioned in various Arabic sources, involves more severe cauterization, using rigid instruments like *misallah*, or a golden nail. Here we may recall Ibn Sīnā's remark that cauterization with gold is the best and most effective method.⁹³ For *al-jiṣṣ*—gypsum, one of the severest illnesses of hunting birds, al-Baladī suggests cauterization, describing it in great detail and referring to the kind of implement used for performing it, in this case a twig from a myrtle shrub—*al-ās*, a very expensive aromatic plant. He describes the body parts on which cauterization is performed: two at the base of the beak on both sides, and the third on the centre of the head. Each of these three places has to be cauter-

⁹¹ Al-Baladī, *al-Kāfi fī al-bayzarah*, pp. 244, 246, 247; al-Ghaṭrīf, *Kitāb Ḍawārī al-ṭayr*, pp. 85, 95, 128; Ibn Qushtumur, *al-Qānūn al-wāḍiḥ*, fols. 113v^o-114r^o.

⁹² Al-Baladī, *al-Kāfi fī al-bayzarah*, p. 242.

⁹³ *Ibid.*, pp. 246-249.

ized with five very light burns, quickly and carefully done. This kind of burn is called *ladh'ah*, like a sting. The tip of the stick to be used is first scorched over fire, and then the cauterization is performed, burning the centre of the head a little more lightly than the others. After describing this method, the author cites the opinion of a falconer named Aḥmad Ibn Khamārawayh, who opposes this treatment for a bird, arguing that it might be fatal for a bird suffering from this disease. He adds that cauterization should be performed only on a very strong fat hunting bird, one that can endure such violent treatment, emphasizing that he has often successfully administered the treatment that he recommends, which is combined with special kinds of food together with intensive physical activity including flying.⁹⁴

C. EMERGENCY TREATMENTS

1. *External Cuts, Internal Tears, and Open Wounds*

The first task of surgery in veterinary medicine was to treat external and internal tears that might endanger the animal's life. Emergency surgery was related mainly to the two tasks of horses in Mamlūk society in which they were liable to be seriously injured: battle and hunting. In battle, most of the injuries were inflicted by weapons such as lances, arrows, swords, burns from fire and burning objects. All of these required urgent attention, especially large wounds with profuse bleeding. In such cases the veterinary surgeon had to intervene immediately to stop the bleeding by stitching the cut or applying bandages with anti-bleeding medication. Abū Bakr's book contains many descriptions of how he himself treated wounds caused by sharp iron tools, apparently referring to swords and lances, and of his urgent treatment of arrow wounds. In the first case, he explains that the shape of the cut dictates the manner of stitching it, the kind of thread to be used, the type of needle, and the distance between stitches.⁹⁵

After the suturing, the treatment is continued with anti-bleeding medication. Abū Bakr discourages the use of runny creams and prefers to use dry powders, *durūrāt*, saying that they are more effective in treating wounds of this sort and also hasten the healing process.⁹⁶ Wounds caused by arrows or broken iron lances were considered more severe than wounds from a sharp sword. The surgeon had to operate to widen the opening where the

⁹⁴ *Ibid.*, pp. 244-245.

⁹⁵ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 143.

⁹⁶ *Ibid.*

jagged point of the arrow had entered the body. Pulling out the arrow might endanger the wounded horse and exacerbate the wound. Here Abū Bakr mentions several instruments that were used in his times for this kind of surgery, such as various needles, cutting instruments and gripping instruments, such as forceps or pincers (*kalbatayn al-nuṣūlīyah*) to pull out the serrated arrowhead (*naṣl*).⁹⁷ After removing the arrow, the surgeon had to exercise great caution, using antiseptic medications to prevent infection of the wounded area. If it became infected, Abū Bakr advised changing the dressing frequently until the wound was completely healed. Injuries caused by burns from blazing objects required different kinds of treatment, such as creams and ointments to heal the skin.⁹⁸

During hunting, there were many occasions when the veterinary surgeon had to treat open wounds inflicted to horses by animals such as lions, panthers and wild boar.⁹⁹ Sometimes there was an urgent need for surgical intervention to stop the bleeding and treat the open wound, although treatment with anti-bleeding agents generally sufficed and surgery was performed only in very severe cases. Abū Bakr cautions against sewing a wound caused by a lion's bite, even if it is a gaping wound. This warning is particularly interesting because it indicates his understanding that closing the wound immediately may be very dangerous due to the possibility of infection, even if he does not state this explicitly. The treatment that he recommends in this case is to wash and clean the wound thoroughly and apply drying substances. Similarly, wounds inflicted by panthers or wild boar were treated with anti-bleeding medication after thorough cleaning of the wound.¹⁰⁰

The severest instance of body wounds described in the veterinary literature is a gaping wound in the abdomen with the intestines protruding outside the body. In this case immediate surgical intervention was essential and the surgeon had to perform a complicated operation on the spot, as described in detail in Abū Bakr's book. This procedure may be called the "ant method," because ants were used to carry out the internal suturing. The conventional material used for sewing wounds was cotton thread, but apparently the surgeons were afraid that the thread would tear and cause damage, so they sought another way to stitch deep cuts. According to Abū Bakr, the "ant method" was invented by his father and consisted of two

⁹⁷ *Ibid.*

⁹⁸ *Ibid.*, p. 145.

⁹⁹ *Ibid.*, p. 141.

¹⁰⁰ *Ibid.*

stages: first, internal stitching to close the inside of the cut, and second, stitching to close the skin. The internal stitching was done with the help of large black ants, called “Solomon’s ants,” in the following manner. First, they laid the horse down on its back and raised its legs in the air to let the intestines fall back into the peritoneal sac and create a space in the torn skin, enabling the surgeon to hold the edges of the wound in his hand in order to sew the edges together. Before sewing, he had to clean the horse’s bowels thoroughly using conventional antiseptics such as wine heated with salt. After cleaning and replacing the intestines inside the peritoneal sac, the surgeon grasped the peritoneum on both sides of the tear, and, holding the ant by its rear end, pressed its tail lightly, causing it to open its mouth. Into the ant’s open mouth he inserted the two torn edges of the peritoneum, released the pressure on the tail, and the ant automatically closed its mouth, biting on the peritoneum and locking it. Afterwards, he cut away the ant’s body while its jaws remained locked on the peritoneum. This procedure was repeated stitch by stitch all along the internal tear, each ant serving to make one stitch, with a space of one finger between every two stitches. When the inside of the peritoneum was completely sutured by the “ant method” the surgeon proceeded to stitch the outer skin with a cotton thread and a special needle (*ibrah musāyifah*—big and thin needle).¹⁰¹ The stitches on the outer skin had to be spaced further apart than the internal stitches, at a distance of two fingers. Abū Bakr explains that this distance is important in order to prevent accumulation of air and humours inside the folds of sutured skin, to avoid infection. This operation was followed up by treatment with medication to hasten the healing process.¹⁰² Despite the strangeness of the “ant method,” it appears to be logical and pragmatic and it seems that he, at least, used it. Needless to say, all these invasive procedures would have been impossible without first stabilizing the animal and reducing its pains. These aspects will be addressed at the end of this chapter.

Abū Bakr also describes several remedies for further treatment of wounds following the operation, such as spraying special powders over the site of the operation, covering it with pads and bandaging it tightly to strengthen the sutures. Adhesive substances were also applied around the area of the wound. Abū Bakr stresses that it is important to give the animal food that will not cause constipation or any other digestive problem that might lead to strain while defecating or urinating, because the stretching

¹⁰¹ *Ibid.*, p. 349.

¹⁰² *Ibid.*

of the abdominal muscles might reopen the wound. On the third day after the operation, he writes, the bandages and pads are removed and in their place various medicaments that facilitate rapid healing of wounds are applied, such as a liniment called *tahlī*, or tar cream (or pitch)—*marham al-zift*.¹⁰³

Abū Bakr relates that he learnt this intricate surgical operation, as well as the use of all those bandages and medications to assist the healing process, from his father, who was also an important veterinary surgeon, working in the stables of the Mamluk Sultan Qalāwūn. He writes that he himself performed many surgical operations on wounds of the abdomen and loins using the “ant method”; the proof of its success was that the horses recovered completely.¹⁰⁴

2. *Surgical Treatment of Hooves*

A major aspect of the veterinary surgeon's work was the treatment of hooves of horses and other large animals.¹⁰⁵ This treatment ranged from routine care such as changing horseshoes to complex surgical operations. The Mamluk veterinary sources discuss in detail the various methods of shoeing and the types of horseshoes suitable for the tasks of the horse, mule or donkey, the kind of nails to be used, the way to drive them in and the number of nails needed.¹⁰⁶ Irregularly shaped hooves required the practitioner to seek appropriate solutions to make walking easier for the horse. There were cases when the veterinary surgeon had to intervene invasively in order to treat problems of the hooves. Some common examples of this are injury by stones and penetration of the hoof by sharp objects such as splinters of wood, nails and thorns. These injuries necessitated cutting the injured area to remove the object. Sometimes these objects also created open wounds, which had to be treated after removal of the foreign object. Abū Bakr explains how to remove a sharp foreign body such as a small bone or a nail that has penetrated the sole. The treatment in this case consists of surgery to open the area and cut the tissue inside. Abū Bakr describes the circular shape of the incision that the surgeon has to perform with a sharp knife blade. He warns of the danger of leaving even the smallest fragment of bone, splinter of wood, or any other foreign body inside the

¹⁰³ *Ibid.*

¹⁰⁴ *Ibid.*

¹⁰⁵ See figure 20, depicting the complicated task of shoeing.

¹⁰⁶ Abū Bakr al-Bayṭar, *Kāshif*, vol. II, pp. 421–436.

hoof. He refers to the situation of a foreign object penetrating the hoof as one of the severest injuries to the hooves.¹⁰⁷

Apart from injury by foreign objects, the area of the hoof was also susceptible to injury resulting from inappropriate treatment, particularly the use of cheap, unsuitable nails. Abū Bakr calls this problem *al-tamshīshah*, stating that it is the direct result of miserliness on the part of the practitioner. Lack of skill on the part of the practitioner could also lead to this problem. Abū Bakr explains that it happens especially when a nail is driven into the wrong place and has to be removed, creating a wound in the hoof. If this injury is neglected it might deteriorate seriously and even become fatal.¹⁰⁸ He emphasizes that the surgeon dealing with this problem must first of all make sure that not even the minutest part of the nail remains in the hoof. This sometimes requires incision of the area to reach a fragment of nail left deep inside the hoof and remove it with forceps or special pincers.¹⁰⁹ This treatment is followed up by medication to heal the wound and prevent the accumulation of “humours” in it. Abū Bakr describes another complication that may occur if the wound is neglected and left without treatment. In many cases this problem is only discovered after a long time due to the horse’s tolerance of pain. In such situations, the veterinary surgeon has to amputate the entire hoof and replace it with an artificial hoof made of metal in the form of a broad strip that covers all the bottom of the foot.¹¹⁰

Another condition that requires surgical treatment of hooves is the narrowing of the hoof, which occurs as a result of limping or walking incorrectly due to pain in the area of the shoulder or the arm, causing the horse to raise its foreleg. The hoof gradually becomes narrower because the horse doesn’t put all his weight on it.¹¹¹ The treatment for this condition can take as long as forty days of filing, cutting, cauterizing and applying softening agents to promote the growth of a wider hoof to replace the narrow one, which gradually disappears in the course of the treatment.¹¹² Front hooves can become distorted and grow in reverse directions, with the hoof of the right foreleg pointing left and the left one pointing right. This defect

¹⁰⁷ *Ibid.*, p. 279.

¹⁰⁸ *Ibid.*, p. 63.

¹⁰⁹ The forceps can be seen among the tools that appear in figure 20.

¹¹⁰ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 277.

¹¹¹ *Ibid.*, p. 65.

¹¹² *Ibid.*, p. 271.

also required surgical intervention, including cutting, excising, filing and attaching special horseshoes until normal new hooves grew.¹¹³

3. *Removal of Foreign Objects from the Head and Throat*

Besides the excision of foreign bodies such as those mentioned earlier (arrow heads, splinters, stones, fragments of nails etc.), surgical intervention was also required to remove tiny objects that entered one of the body orifices, particularly the ears, nostrils and throat. To remove gravel, grains of sand, or pips of fruit that had entered the ear, the doctors introduced a swab smeared with an adhesive substance, thus trapping the foreign body and pulling it out.¹¹⁴ In a horse, a bout of coughing could be caused by swallowing a feather or other foreign object, and it was vital to determine the cause of the coughing in order to decide on the treatment. The most suitable way of removing a swallowed feather was to tie a piece of soft cloth soaked in oil and honey to the end of a stick and then insert the stick gently into the throat and pull the feather out with it.¹¹⁵ A similar technique was used for removing a bone stuck in the throat of a hunting dog. For this the doctor had to hold the dog's head with its snout pointing towards the neck, causing it to expel the bone in an instinctive reflex (*li-tadjara bi-dhālika wa-talfazah*).¹¹⁶ Before performing this action they poured a little oil down the dog's throat to help the bone emerge smoothly. The doctor had to exercise great caution in order to avoid scratching or wounding the gullet while extracting the bone.¹¹⁷

4. *Eradication of Parasites*

Surgical intervention was sometimes necessary to remove leeches that invaded the animal's body through the mouth or the nostrils.¹¹⁸ It was not always possible to remove leeches from the animal's mouth simply by opening it manually and tearing away the leech stuck to the palate. If the leech had penetrated more deeply and the doctor could not reach it with

¹¹³ Al-Malik al-Ashraf, *al-Mughnī fī al-bayṭarah*, pp. 125-126.

¹¹⁴ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 159.

¹¹⁵ Al-Malik al-Ashraf, *al-Mughnī fī al-bayṭarah*, p. 118; Al-Ṣāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. II, p. 94.

¹¹⁶ Ibn al-Ḥashshā' (attributed to), *al-Manṣūrī fī al-bayṭarah*, p. 179.

¹¹⁷ On methods of dealing with a bone stuck in a dog's throat and eradication of parasites such as leeches, see Ibn al-Ḥashshā' (attributed to), *al-Manṣūrī fī al-bayṭarah*, pp. 178-179.

¹¹⁸ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 177 (leeches in the nostrils—'*alaq fī al-minkharayn*'), p. 189 (leeches in the mouth—'*alaq fī al-famm*').

his hand, he had to use intricate surgical methods requiring skill and agility. The veterinary sources describe an instrument called “ladder” (*sullam*) because of its shape.¹¹⁹ Similar treatment was needed for leeches that had attached themselves to the inside of a dog’s throat, except that in this case substances for detaching the leech from the lining of the throat were rubbed or sprayed inside the throat before the surgeon pulled out the leech.¹²⁰ The treatment was completed with medication to prevent infection.

Another parasite that necessitated similar medical intervention was the *zanbūr* (pl. *zanābīr*)—presumably pinworms (*oxyuris equi*), which invaded particularly pack animals, such as donkeys and mules. This parasite attached itself to the lining of the rectum, causing considerable physical weakness and weight loss. The treatment consisted of oiling the hand and inserting it into the rectum to pull out the worms that were attached to its lining, and afterwards rubbing oil on the area.¹²¹

5. Enemas

Although administering enemas to animals did not entail cutting anywhere in the body, the very fact of inserting special instruments or the practitioner’s hands to introduce medications into the intestines or remove materials was a kind of surgical procedure that can be considered as internal intervention.¹²² The enema was considered an effective method for treating many diseases. The instruments used for administering enemas to humans were mostly simple instruments made of bamboo shoots or sugar cane.

The veterinary sources mention some illnesses of large animals, such as horses, mules, donkeys and camels, that could only be cured by enemas,

¹¹⁹ This instrument also served for opening a horse’s mouth to enable the doctor to insert eggs into the throat in the case of a severe cough caused by fever. See Abū Bakr al-Baytār, *Kāshif*, vol. II, pp. 207, 213.

¹²⁰ Ibn al-Ḥashshā’ features a description of treatment to remove leeches from dogs’ mouths using the incense method, whereby incense produced by burning various insects was inserted into the throat. See Ibn al-Ḥashshā’ (attributed to), *al-Manṣūrī fī al-bayzarah*, p. 179.

¹²¹ Abū Bakr al-Baytār, *Kāshif*, vol. II, pp. 312–313. The translator of the text into French provides different translations of the term *zanbūr/zanābīr*. In this context he identified it as ‘hippobosques’ (flat flies, hippoboscids), whereas elsewhere (p. 70) it is translated as ‘oxyures’ (pinworms, *oxyuris equi*). The latter identification seems more appropriate in this context. See *The Merck Veterinary Manual*, eighth ed., 1998, p. 202.

¹²² See figure 39, depicting a veterinary surgeon administering an enema to a horse. In fact, the plate is taken from a non-Arabic fourteenth-century manuscript, but the scene depicted matches the common practise in Egypt and Syria during the Mamluk period.

most of them related to the digestive or urinary system, such as severe constipation, urinary difficulty, or stones in the ureters and bladder. Such internal diseases were regarded as fatal, therefore their treatment depended on the correct diagnosis. *Maghl* is described as resulting from an accumulation of air in the blind intestine (caecum), causing urinary and faecal retention. Abū Bakr states that this illness can be fatal, therefore it is important to start treatment without delay. First he suggests several substances to be ingested by eating, drinking or smelling, as well as a kind of kohl to be applied to the eye, although he considers enemas containing medications more effective in helping the sick animal to evacuate faeces and urine. He suggests two kinds of enema. One is a manual enema, performed by inserting the hand through the anus and cleaning the area, manually removing the blocked faeces, and then inserting suppositories made of various purgative substances. The other kind is performed with an instrument, introducing medications such as ground safflower (*Carthamus tinctorius*, ar. *qurṭum*) and botanical substances such as beet (*silq*), fenugreek (*ḥulbah*), and marshmallow (*khaṭmīyah*) in equal quantities, boiled with a little water and oil. After the enema, the horse is given a drink made of asafetida boiled in pure water with sugar added.¹²³ Different botanical mixtures may be used for this kind of enema, based mainly on seeds and cereals like fenugreek, flax, chamomile, added to seeds of vegetables and fruit, such as seeds of radish, onion, figs, and others. The basic ingredients of the various enemas consisted largely of purgative substances that were known from practical experience and such as had proven effective for both animals and humans. The enemas recommended by Abū Bakr were designed mainly for treating *maghl*, but he emphasizes that they are also effective for other diseases, such as colds, *qawlanj*—the fourth disease listed above,¹²⁴ an ailment called *rīḥ al-sūs*, and also for worms in the intestines. In this case, too, the enema came to supplement treatment based on drinks containing laxative substances such as fenugreek, dissolved in boiling water with the addition of a little fennel and anise. A little wine was also considered an effective remedy for this disease, and so was a suppository made of soap. For *qawlanj*, Abū Bakr suggests the same methods as those prescribed for the intestinal diseases described above, with the

¹²³ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 355-357.

¹²⁴ This disease is colitis, ulcerous inflammation of the large intestine, marked by severe blocking of the intestines, expressed in total arrest of faeces and air from the bowels.

same prescriptions, naturally including the enemas that were effective for treating *maghl*.¹²⁵

Two other diseases that were treated with enemas are tuberculosis [consumption] (*al-sill*)¹²⁶ and cramps (*al-lazaz*).¹²⁷ The enema recommended for these diseases contained a mixture of plants, such as chard,¹²⁸ watercress (*jirjir al-mā'*),¹²⁹ violets,¹³⁰ and green hollyhock (*khuṭmīyah khaḍrā'*).¹³¹ These ingredients were boiled in water and left to evaporate over the fire until they were reduced to one third of the quantity, which was then strained, and a little violet oil¹³² was added, together with some

¹²⁵ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 359.

¹²⁶ *Ibid.*, pp. 362-363.

¹²⁷ *Ibid.*, p. 371.

¹²⁸ Chard, a type of beet, is known for its medicinal qualities, and Ibn al-Bayṭār counts a long list of treatments based on it. Its main use was for treating digestive problems, especially stomach spasms. It was considered effective for treating colic, which also affected humans, and for them he suggests using an extract from this plant. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. II, part 3, pp. 34-36.

¹²⁹ Rocket—*jirjir al-mā'*, is a member of the mustard family. Ibn al-Bayṭār refers the reader to another plant called *qurraṭ al-ʿayn*, defining it as equivalent to “water’s celery” (*karafs al-mā'*). He says it is a type of plant that grows in water and is also called water celery. According to Galen, quoted by Ibn al-Bayṭār, the medicinal properties of this plant have a positive effect on the urinary system and help to shatter or dissolve stones in the ureters and kidneys, are also beneficial for menstrual bleeding and for treating inflammation in the intestines. See *Ibid.*, vol. II, part 4, pp. 250-251.

¹³⁰ The violet appears in many Muslim pharmacology and medical books. Ibn al-Bayṭār cites a long list of famous names in the world of medicine, including Dioscorides, Galen, Masīḥ, Ḥubaysh, al-Rāzī, Ishāq b. ʿImrān, al-Tamīmī, Ibn Sīnā, and others, all of whom advised using this plant for treating various problems of humans, including epilepsy of children, severe coughing, headaches and pneumonia, but mainly for digestive problems in the stomach and intestines, caused by yellow bile according to the scholars. He quotes Ibn Sīnā as saying that violets are good for treating kidney pains and urinary problems. According to al-Rāzī and others, the violet’s main virtue was as a laxative. See *Ibid.*, vol. I, part 1, pp. 156-157.

¹³¹ The hollyhock (*Alcea*), today seen as an ornamental plant, was reputed for its medicinal properties in the Middle Ages. Ibn al-Bitar writes that according to Dioscorides, it resembles to the Jew’s mallow (*mulūkhīyah*). It was mainly effective in treating gastric and urinary problems, kidney stones and intestinal inflammation, and also served as a demulcent for severe pains, an anti-inflammatory medicine, a cure for pneumonia, a cough medicine, a remedy for skin problems, an antidote for poisoning by insects and mosquitoes, and even for treating sterility. See *Ibid.*, vol. I, part 2, pp. 333-335.

¹³² Ibn al-Bayṭār describes the various methods of preparing violet oil, which was a well-known cure for various diseases. He also recommends using it regularly after the weekly Friday visit to the bath-house. It was considered effective for severe headaches, coughs, shagginess of the head, beard, and eyebrows, reduced joint mobility, problems with fingernails and toenails, respiratory problems, urinary tract inflammation, muscle problems and insomnia. See *Ibid.*, p. 391.

duck fat.¹³³ The recommended quantity to be administered to a horse was three rotls of the mixture with one ounce of fat. This enema was repeated for three consecutive days, during which the veterinary surgeon had to stroke the horse and give it food and drink suitable for treating this kind of disease.¹³⁴

As mentioned, enemas were also performed without using the syringe (*miḥqanah*), by inserting the hand into the rectum and cleaning out the hardened faeces or worms that were found there.¹³⁵ The veterinary surgeons managed to deal with many digestive problems of animals in this way, without using instruments or special medication. After cleaning out the rectum, Abū Bakr recommends using egg-shaped suppositories made of a kind of honey, called *nāṭif*,¹³⁶ mixed with a substance prepared from scammony (*saqamūniyā*).¹³⁷ In case these treatments failed to help the animal

¹³³ Although difficult to digest, duck fat is mentioned in pharmacology books as being good for treating digestive problems, enhancing male virility, fortifying the blood, and especially for fattening. It is described as being more effective than all other bird fats. In the falconry literature it is recommended for use in preparing pain relieving medications and bandages to immobilize fractures or dislocations in hunting birds. See *Ibid.*, vol. I, part 1, p. 93; Ibn Sinā, *al-Qānūn fī al-ṭibb*, vol. I, book 2, pp. 436, 570, 591; vol. II, book 3, p. 1240; al-Balādī, *al-Kāfī fī al-bayṣarah*, pp. 320-321.

¹³⁴ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 407.

¹³⁵ See figure 38.

¹³⁶ Honey has been used for healing purposes since the dawn of history, and its curative virtues are many. Both in scholarly medicine and in folk medicine it was considered a panacea due to its natural qualities of warmth and dryness, and medications containing honey were offered to the sick and healthy alike. In the "Prophet's medicine" honey was held in high regard as a cure for illnesses. Various traditions even quote the Prophet, who advised his believers to eat honey in the morning at least three times a month as a safeguard against every illness (*man la'īqa thalāth ḡhadawāt kulla shahr lam uṣibhu 'aẓīm al-balā'*). In scholarly medicine, the range of diseases for which honey was suggested includes digestive problems (resulting, according to the theory, from accumulation of phlegm in the body), to purulent sores and tooth infections. Daily massage with honey for a month was recommended for enlarging the penis. The quality of different types of honey is discussed in the various sources, and those from Sicily and Sardinia are described as the best. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. II, part 3, pp. 165-168; Ibn Qayyim al-Jawziyah, *al-Ṭibb al-nabawī*, pp. 25-28.

¹³⁷ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 357. According to Dioscorides, quoted by Ibn al-Bayṭār, scammony (*saqamūniyā*) [*Convolvulus scammonia*] was a glutinous plant used by pharmacists for preparing many medical products due to its healing properties. Ibn al-Bayṭār enumerates various species of this plant according to the region of its growth. He remarks that the worst kind grows in Syria and Palestine. This natural adhesive, when mixed with other botanical materials from the gum tree or citron, was believed to be effective in curing illnesses originating from excess of yellow bile in the body. It was also recommended as treatment for digestive problems due to its property of assisting digestion and its laxative effect. A quality unique to this material was that it could be kept and used as a medication for long periods (30-40 years). See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. II, part 3, pp. 23-26.

to release faeces and urine, Abū Bakr offered another remedy, also based on an enema, emphasizing that he himself had tried it with great success. For this treatment the veterinary surgeon was helped by his apprentice, who rubbed oil on his hand and then inserted it through the rectum until he could feel the bladder, which he massaged gently with his fingertips using delicate downward movements. Abū Bakr emphasizes that the apprentice must keep his fingernails cut short, otherwise he is liable to tear the bladder and cause severe damage, even death.¹³⁸

Enemas occupy an important place in hawking and falconry treatises. Bamboo shoots or sugar cane were also used for performing enemas in birds, but sometimes, when extreme caution was exercised, the use of a feather or even a silver instrument was recommended.¹³⁹ The use of silver instruments for administering enemas to hunting birds could also be related to the prestige of the bird, and, of course, also to the status and prestige of the bird's owner.

The most detailed description is connected with the treatment of a condition known as "plaster" (*al-jīṣṣ*), in which the faeces of falcons or hawks harden like plaster. This occurred frequently in hunting birds. One of the common treatments was administration of an enema after the "plaster" had developed into a chronic disease in the hawk. The purpose of the enema was to introduce a large number of medicaments into the body; the mixture used for treating *al-jīṣṣ*, for example, contained ten *mithqāl* of barley chaff, five measures of *sabt*, three *mithqāl* of fenugreek, one measure of opopanax—*jawāshīr*, and similar quantities of colocynth—*ḥanḏal*, sarcocolla—*ʿanzarūt*, *darānī* salt, borax—*bawraq al-ṣāghah*¹⁴⁰ and red

¹³⁸ Abū Bakr writes that his father ordered him not to grow his fingernails and to trim them whenever he noticed that they were too long, for fear that he might damage the animal's bladder or intestines when inserting his hand into the rectum. He asked his father what he would do if he obeyed him and cut his fingernails and then he could not treat another illness called *al-khuld*, which required the practitioner to scratch the growth with his fingernails. His father could not answer this question and said that he should massage the bladder with his fingertips, but be very careful not to scratch it. Abū Bakr also describes other methods of treating *mughl* which he considers useless, methods such as bloodletting, cauterization with a white hot iron and scraping off other small parts of the horse's eyes or nostrils in order to keep it busy with the new pain and distract its attention from the agony of the abdominal spasms. Abū Bakr sharply criticizes the people who justify this useless method which serves only to intensify the pain. See Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 357.

¹³⁹ Al-Baladī, *al-Kāfi fi al-bayzarah*, pp. 268-277.

¹⁴⁰ *Bawraq* is sodium borate, or borax. The type known as Armenian borax is a compound of salt and potassium oxide. Ibn al-Bayṭār mentions many types of borax that differ in their mineral composition and colour and are used for treating different diseases. One type that was used for washing in the bath house was thought to be good for healing

arsenic, called *zirnīkh aḥmar*.¹⁴¹ All these substances were mixed together and put into a copper kettle with 260 *dirhams* of water. The kettle was sealed hermetically by blocking the spout with clay or plaster and left over the fire all night. The infusion that remained in the kettle the following day was thoroughly filtered and poured into a glass jar or bottle.

Another enema for treating “plaster” is described in the veterinary literature as equally effective but different in its composition. The ingredients of this enema were designed to produce a reaction in the solidified material lodged in the intestinal canal, dissolving, or at least softening it, and thus easing its way out of the body. It is worth noting that most of the veterinary writers specify the precise quantities and weights of the ingredients to be used in preparing medications as a major aspect of the discussion on illnesses, thus making the dispensing of medicines an integral part of the surgeon’s work.¹⁴²

Similar explanations on the preparation of medications appear in medical literature dealing with humans, but there the role of dispensing medications, at least during the Mamlūk period, was the specialization of the professional pharmacist, in Arabic *ṣaydalī*, or of the *‘aṭṭār* in folk medicine.¹⁴³ It appears that falconers, on the other hand, prepared the drugs themselves, like al-Baladī, who describes how he prepared a mixture of substances for an enema, including honey, oil, salt, Persian borax (*bawraq fārisī*), cow’s milk, “vine water” (perhaps meaning wine), and essence of fennel—*rāziyānāj*. He explains how to mix all the ingredients together in a bowl

skin diseases. Another type was helpful for curing respiratory problems and also for treating mushroom poisoning. It served the pharmacists in preparing compounds and creams for treating many skin diseases. It was a major component in many medicaments such as ear drops, anti-rabies medicine, bandages for muscle problems, enemas, and drugs for digestive problems. This salt, with the addition of honey, was also used to prepare cream for rubbing on the penis in order to prolong the duration of an erection. See Ibn al-Bayṭār, *al-Jāmi‘ li-mufradāt al-adwiyah*, vol. I, part 1, pp. 170-173.

¹⁴¹ *Zirnīkh aḥmar*—realgar is an arsenic sulfide mineral, also known as “ruby sulphur” or “ruby of arsenic,” a poisonous mineral which, according to Galen, burns like fire, was used in the preparation of various medications for treating skin diseases such as alopecia—“fox disease” (*dā’ al-tha’lab*). It was considered effective against lice and served for treating wounds, hemorrhoids, hoarseness of the voice, chronic coughing, stomach ache, intestinal ulcers, prevention of hair growth, and so forth. The sources mention three varieties of arsenic, differentiated according to their colour. White arsenic is the most noxious, yellow arsenic is effective for wounds caused by whipping, and red arsenic is the most useful for medicinal purposes. Half the weight of yellow arsenic could be used as a substitute for red arsenic. See *ibid.*, vol. I, part 2, pp. 465-466.

¹⁴² Al-Baladī, *al-Kāfi fi al-bayzarah*, pp. 269, 272, 276, 277.

¹⁴³ On the pharmacists in Mamlūk Egypt see Chipman, *The World of Pharmacy*, pp. 111-174.

and heat it over fire, then pour the mixture into a gall bladder of another animal emptied of its contents and washed thoroughly in “vine water.” Al-Baladī suggests using this mixture for administering an enema to a hawk suffering from a severe case of “plaster.” Then he explains how to perform the enema, holding the hawk between the professional’s two hands (more than one person is required for this), and inserting the enema instrument, in this case made of a duck’s feather, containing the substances prepared in advance. The falconer has to hold the feather inside the bird’s rectum for a few moments until he is sure that the medication has entered the body, and only after that to release the hawk and feed it meat in a quantity of “two almonds.” Afterwards he must not feed the bird until the next day, and then feed it to its satisfaction with the meat of a black hen coated with oil.¹⁴⁴

Another enema described in the sources includes simpler ingredients, but the manner of administering it was more difficult. The ingredients consisted of white figs and liquorice root minced together with safflower (*qirtīm*) oil.¹⁴⁵ This mixture was introduced into the body by means of a small cone-shaped instrument called *miḥqanah*. The difficulty in performing this kind of enema concerned the need to hold the hawk for a while with its stomach facing upwards in order to allow the material to dissolve inside the gizzard and the bowels, and then tying it to its own perch (*kan-darah*), with a bowl of clean water placed nearby.¹⁴⁶

The prescription for another enema suggested as a treatment for “plaster” includes the use of a stalk of some unspecified plant and a mixture similar to the one described above, with the addition of fat from a sheep’s tail, wax and milk, to be boiled in a pan (*ṭanjīr*). After scooping off the layer of fat that forms on the top, the practitioner has to wait for the mixture to cool and then introduce it into the bird’s rectum. The author explains how to adjust the tip of the stalk and cut it to fit exactly the bird being treated, emphasizing that a different kind of stalk is needed for every type

¹⁴⁴ Al-Baladī, *al-Kāfi fi al-bayzarah*, pp. 272-273.

¹⁴⁵ Safflower (*Carthamus tinctorius*) was used by the Mamluks for extracting oil and for dyeing cloth. See Ibn al-Bayṭār, *al-Jāmi’ li-mufradāt al-adwiyah*, vol. II, part 3, p. 259-260. Abū Rayḥān al-Bīrūnī, in his book on pharmacology, mentions three types of carthamus: ‘common’ carthamus, Indian carthamus, and wild carthamus. These three are mentioned in various medical sources. The first (*Carthamus tinctorius*), according to al-Bīrūnī, is referred to by Galen as *qanīqūs*, while the type known as *ṣāḥib al-mashāhīr*, literally “owner of the famous” is called in Persian *kākyān* or *kāhyān*, and in ancient Syrian *khri’ā*. Abū Bakr al-Rāzī describes it as similar to *al-anjūrah*, but less powerful in terms of its curative effect. See Abū Rayḥān al-Bīrūnī, *Kitāb al-Saydana fi’l-ṭibb*, p. 486.

¹⁴⁶ Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 277.

of hunting bird and it has to be matched to the exact width and length. The quantity to be administered is also measured and should not exceed the size of a finger. After the enema, it is important to supervise the amount and the quality of the food given to the bird in order to help its recovery. The season of the year also has to be taken into account: the author remarks that in winter any amount of wax can be used in preparing the enema, but in the hot summer the doctor must take care to add a measured quantity of wax.¹⁴⁷

Sometimes enemas were introduced into the hunting bird's rectum without using any instrument, simply by inserting them manually in order to budge hardened faeces in the anus or in the folds of the rectum. One author mentions a prescription including fat from a sheep's tail, thoroughly crushed with a pestle and inserted into a hawk's anus with a finger. He specifies the exact weight of the material to be administered to this kind of bird, emphasizing that the weight varies according to the type of bird to be treated. A smaller bird, such as a Sparrowhawk (*bāshiq*) is given one third of the quantity recommended for a goshawk (*bāzī*). The bird has to be held all the time until the fat dissolves inside the gizzard and the bowels, and then it has to be tied to its *kandarah* until it succeeds in expelling some faeces, and after that it is given water to drink.¹⁴⁸ Presumably, administering an enema to a goshawk was no simple task, although the description in most of the sources implies that it was common practise. Besides enemas, the authors describe less invasive methods of treating this illness, most of them based on foods with a laxative effect.¹⁴⁹

D. ORTHOPEDIC SURGERY

The treatment of such problems in humans is discussed in Abū Bakr al-Rāzī's comprehensive treatise *al-Ḥāwī fī al-ṭibb*, in a chapter devoted to treatment of different types of dislocation. He relates only to external methods, whereby the doctor immobilizes the area after re-aligning the joint. He emphasizes this action of re-aligning the joint by pressing on the area and does not mention any surgical procedure such as that described

¹⁴⁷ *Ibid.*, pp. 276-277.

¹⁴⁸ *Ibid.*, p. 276.

¹⁴⁹ *Ibid.*, pp. 275, 277; al-Ghaṭrīf, *Kitāb dawārī al-ṭayr*, pp. 138-140; al-Ḥasan b. al-Ḥusayn (presumably), *al-Bayzarah*, pp. 84-86; Kushājīm, *al-Maṣā'id wa-al-maṭārid*, p. 120; Ibn Qushtumur, *al-Qānūn al-Wāḍiḥ*, K.K., Ms. 978, fols. 110r^o-113v^o.

in animal medicine.¹⁵⁰ Ibn Sīnā expresses a similar approach in discussing problems of dislocated joints, and he, too, makes no mention of invasive treatment in this context.¹⁵¹

Al-Zahrāwī, the most eminent surgeon in Islam, does not recommend invasive surgical procedures for treating fractures and dislocations in humans.¹⁵² Even in cases of fractures of a large bone such as the femur (thigh bone) or the humerus (arm bone), when the fracture is described as large and serious, he prefers not to operate and chooses to leave the fracture until the limb decomposes and falls off, after 20 or 30 days, without the doctor's intervention. He claims that invasive surgical intervention is dangerous and might even be fatal for the patient, therefore he prefers to leave the broken limb until it heals by itself or putrefies and falls off.¹⁵³ It is surprising to find it in al-Zahrāwī, who is known in medical history as one who was not averse to using surgical methods, even in very sensitive areas such as the skull.¹⁵⁴

Orthopedic surgery does feature extensively in the veterinary sources, covering treatment of broken bones, sprains, dislocations, and so forth. During the Mamlūk period animal orthopedics was more developed than human orthopedics and understandably so, because a dislocated joint could put a horse or other large animal out of action; therefore, the veterinary surgeon had to intervene, cutting the skin with special surgical knives and using reeds and syringes to introduce glutinous and immobilizing substances such as tar (*qaṭrān*). This operation entailed the use of a white-hot iron to cauterize the blood vessels and stop the bleeding before the surgeon acted to immobilize the broken bone from the outside.¹⁵⁵ Surgical intervention, such as that described in the treatment of large animals, is barely mentioned in general medical books.

Orthopedic surgery was not restricted to large animals, and the high level of performance in this field is manifested in one of the special surgical treatments used on hunting birds. Although these are delicate and very vulnerable creatures, the surgeons attempted to repair their talons, which

¹⁵⁰ Abū Bakr al-Rāzī, *al-Ḥāwī fī al-ṭibb*, vol. XIII, pp. 172, 194, 219, 220.

¹⁵¹ Ibn Sīnā, *al-Qānūn fī al-ṭibb*, vol. III, book 4, pp. 2029-2045.

¹⁵² On al-Zahrāwī and the treatment that he recommends for broken bones, see 'Abd al-Nāṣir Ka'dān, *Ilāj al-kusūr*, 1990, pp. 108-139.

¹⁵³ 'Abd al-Nāṣir Ka'dān, *Ilāj al-kusūr*, p. 126; M.S. Spink and G.L. Lewis, *Albucasis on surgery and instruments: a definitive edition of the Arabic text with English translation and commentary by Abū al-Qāsim Khalaf ibn 'Abbās al-Zahrāwī*, London: Wellcome Institute of the History of Medicine, 1973, p. 779.

¹⁵⁴ 'Abd al-Nāṣir Ka'dān, *Ilāj al-kusūr*, p. 113.

¹⁵⁵ Al-Malik al-Ashraf, *al-Mughnī fī al-baytarah*, pp. 80-83.

were indispensable for hunting. The practise of hunting and falconry was based on good anatomical knowledge of the bird and of how to make use of its natural ability to hunt. These birds were subjected to an arduous training process in order to make the best of their natural skills, but they sometimes sustained severe physical injuries. The special difficulty entailed in treating talons that had been torn out involved not only restoring them but keeping them in place and returning them to use.¹⁵⁶ For this purpose, several methods were at the disposal of the veterinary surgeons, most of them based on the use of viscid substances such as glue and various resins, graded according to strength.¹⁵⁷

The hawking and falconry books emphasize the difficulty of setting broken bones of hunting birds, because these creatures do not understand that increased movement and activity will only make matters worse, while rest and immobility are essential for healing the fracture.¹⁵⁸ A broken wing, for example, was especially hard to set and almost impossible to treat. To immobilize birds' broken or dislocated bones, the surgeons used dressings containing adhesive substances. Apart from the conventional substances in orthopedic use, such as egg whites, fats, gum-senegal—*aqāqīyā* (acacia?), olibanum—*lubān* and dragon's blood—*dam al-akhawain*, the books also mention a substance prepared from a mixture of river snails added to *lubān* mastic and egg whites. This sticky paste was very strong and the practitioner was warned not to touch it and to use a special stick for spreading it on the broken limb.¹⁵⁹

E. PLASTIC SURGERY

1. *Excision of Skin Growths (Corns, Warts, Abscesses, and Heel Spurs)*

Most of the veterinary sources refer to skin problems such as warts and abscesses as common problems whose treatment requires minor surgery, adding that similar problems occur in humans and they are treated in the same way in both cases. Concerning to abscesses, for example, Abū Bakr states that the treatment for both humans and animals involves washing

¹⁵⁶ The treatment of a broken torn-out talon will be described below in a section dealing with skin and organ transplants.

¹⁵⁷ Al-Baladī, *al-Kāfi fī al-bayzarah*, pp. 320-323.

¹⁵⁸ *Ibid.*, p. 320.

¹⁵⁹ *Ibid.*, pp. 322-323; al-Ghaṭrīf, *Kitāb ḍawārī al-ṭayr*, p. 126; Ibn Qushtumur, *al-Qānūn al-wāḍiḥ*, K.K., Ms. 978, fols. 148r^o-149r^o.

the area in hot water mixed with lye.¹⁶⁰ Thorough washing of the area where an abscess had formed was a vital step in the treatment, because hot water helped to drain the pus that had accumulated in the abscess and also helped to soften the skin. After washing, fats, oils and candle wax were rubbed on the abscess. The sources also mention other mixtures containing healing substances to help soften the skin in the area of the abscess.¹⁶¹ The purpose of all these procedures was to cause the abscess to open and enable the veterinary surgeon to drain out the pus by pressing on the inflamed area. After draining the abscess, the next stage was to insert a capsule containing healing substances such as honey and sarcocolla (*anzarūt*)¹⁶²—into the open abscess. Alternatively, lotions or suppositories containing medicaments with a similar effect could be applied.¹⁶³

The treatment for warts was also similar for animals and humans. The veterinary sources suggest methods such as tying the wart with horsehair until it dries up and falls off, or pulling it out with a *minqāsh ḥadīd*, an iron instrument similar to pincers. Other treatments mentioned include spraying the wart with camel urine or burning it with candles. All these methods call for sprinkling powders to dry the skin after removal of the wart.¹⁶⁴

Another problem that required the veterinary surgeon's intervention was an outgrowth of bone in the feet of hunting birds, a condition called in the sources *mismār* (nail), similar to a bone spur in humans. The operation described in the literature includes the use of a piece of skin taken from a sheep's tail, punctured with four holes, each one designed for one of the bird's talons, like a glove. This glove was tied tightly round the fingers

¹⁶⁰ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 131. *Ushnān* (lye), is a plant that was used for washing clothes. Al-Bakrī describes a leafless plant that grows only as branches that may reach a great height and serves mainly for heating. According to al-Rāzī, this plant had the characteristics of iron and could help in cleaning and removing skin growths. Ibn Sīnā describes a plant with abortive properties. See Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. I, part 1, p. 51.

¹⁶¹ Some other plants that were considered effective for softening the area and draining the abscess were essence from the endive—*hindabā'* plant, nightshade—*'inab al-tha'lab*, and *qirūṭī*. See Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 131; Anonymous, *al-Jawād al-'arabī*, p. 221; al-Šāḥib Taj al-Dīn, *Kitāb al-Baytarah*, vol. II, pp. 227–228.

¹⁶² According to Abū Rayḥān al-Bīrūnī, sarcocolla—*anzarūt* is the name of the ginger plant in India, and in Persian it is called *kanjadhah*. He states that Galen identified *anzarūt* with the resin of a tree that grew in the region of Persia. See Abū Rayḥān al-Bīrūnī, *Kitāb al-Saydana fi'l-ṭibb*, p. 79.

¹⁶³ For example, a cream boiled together with equal quantities of wax—*sham'*, fat and tar, and half the quantity of ginger. This was spread on the area until a scar formed and the pus disappeared completely. See Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 131.

¹⁶⁴ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 131. Cf. Anonymous, *al-Jawād al-'arabī*, p. 297.

with a fine thread and kept bound for four consecutive days, the intention being that this binding would help to remove part of the bony outgrowth in the foot. During this period the skin was kept moist with water. After four days, the binding was removed slowly and gently, and the procedure was repeated for another seven days, after which the “nail” could be removed. The torn-out bone spur left a hole that had to be filled with healing substances such as resin from the mastic tree or a piece of skin to protect it from water. One of the veterinary sources mentions the use of a sharp tool to cut away the ‘nail’.¹⁶⁵

2. *Haemorrhoids*

Descriptions of haemorrhoid treatments abound in the Mamlūk veterinary sources. It should be noted that the modern Arabic term for haemorrhoids, *bawāsīr*, does not necessarily match the definition of haemorrhoids in the period discussed here. In the Mamlūk sources the term *bāsūr* (singular) defines every problem that affects the superficial blood vessels and causes hemorrhage due to dryness or inflammation. In addition to the familiar definition of haemorrhoids in the anus, we may find references to “haemorrhoids” in the feet (*kaḥḥ*) of hunting birds,¹⁶⁶ in the cushion of the horse’s hoof, in a horse’s penis,¹⁶⁷ and even in the eyelids, in this case called *nawāsīr*.¹⁶⁸ Abū Bakr counts Haemorrhoids among the illnesses that affect animals’ hindquarters and he explains how to diagnose this illness, saying that it can be detected by the presence of a red bunch similar to grape seeds emitting a bad smelling purulent discharge, which eventually blocks the anus.¹⁶⁹

Abū Bakr’s chapter on treatments includes a discussion of various methods of treating haemorrhoids. Some of these treatments, although practised in his day, do not meet with his approval. One of these, for example, consists of tying the protruding “glands” (or swollen blood vessels) around the anus with a thread in order to make them dry up and fall off, after which the doctor has to rub creams on the area and bandage it with dressings containing drying and anti-bleeding substances. Another method that Abū Bakr decried, although it was popular in his day, was to cut off the protruding

¹⁶⁵ Al-Baladī, *al-Kāfi fī al-bayzarah*, p. 301.

¹⁶⁶ *Ibid.*, p. 225, 300; al-Ghaṭrīf, *Kitāb dawārī al-ṭayr*, p. 124.

¹⁶⁷ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 309, 321; al-Ṣāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, vol. II, p. 180.

¹⁶⁸ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 169.

¹⁶⁹ *Ibid.*, p. 71.

haemorrhoids with a sharp knife. Instead, he recommends opening the haemorrhoids and squeezing the “glands” to extract the liquid pus accumulated inside, and then spreading coarse salt on the area and massaging the grains into the drained “glands.” After this, he advises massaging the area with rose oil and gently pushing the protruding glands with a finger back into the rectum, concluding the treatment by inserting powder into the anus.¹⁷⁰

Abū Bakr explains in great detail how to prepare the medications that guarantee the success of the treatment in his opinion. One of the medications that he used contained equal quantities of the following substances: papyrus (*qarṭās muḥraq*),¹⁷¹ gall nuts (oak gall),¹⁷² zinc, copper, or vitriol (iron sulphate),¹⁷³ and pomegranate flowers—*jullanār*.¹⁷⁴ He recommends crushing these substances together and spreading them over the anus while pressing on the Haemorrhoids. In a concluding sentence he emphasizes that this medical product is “effective and has passed the test of experience.”

¹⁷⁰ *Ibid.*, p. 309.

¹⁷¹ *Qarṭās* is another name in Arabic for papyrus (the common name is *bardī*), which grows mainly in Egypt. Ibn al-Bayṭār states that burnt *qarṭās* is the name of a medication prepared from the papyrus plant. He cites Dioscorides as saying that it was effective in facilitating the ‘ripening’ and opening of hemorrhoids. It was also used for enemas, as a drink to cure diseases of the spleen, to stop bleeding in the jaw, soothe pains from stomach ulcers, heal purulent sores, and more. See Ibn al-Bayṭār, *al-Jāmi‘ li-mufradāt al-adwiyah*, vol. I, part 1, pp. 119–120 [*bardī*], vol. II, part 4, p. 261 [*qirṭās*].

¹⁷² Gall nuts or oak gall—*aḡṣ*, appear in the pharmacology books as being especially good for treating hemorrhoids and swelling in the anus. It was also considered good for soothing pain and stopping bleeding in the teeth and gums, and as a powder to be introduced into the nostrils to treat nose bleeds. See *Ibid.*, vol. II, part 3, pp. 173–174.

¹⁷³ Ibn al-Bayṭār explains that *zāj* (vitriol) is a metallic mineral substance divided into several types according to colour, which indicates the chemical composition. For example, white *zāj* is zinc sulphate, blue *zāj* is copper sulphate, and green *zāj* is iron sulphate. There is also a type called *zāj zait*—sulphurous acid, and similarly a substance called *ruh al-zāj*, which is also divided into types. Citing Ibn Sinā, he writes that these types differ according to the extent to which they mix with or dissolve in water, and each type has a different name related to its composition. Another substance, called *zāj al-asākifāh*, was often used in preparing medications. Referring to Ibn Juljul (d. 994), he notes that its Greek name was *mālītīryā*. Ibn al-Bayṭār mentions that Galen described the *zāj* as a mineral or a type of metal found in Cyprus, which he himself had brought from there and used in medicine. Every one of the types mentioned here was used for medical purposes. According to Ibn al-Bayṭār, Aristotle considered all of them effective for staunching bleeding. One known as *qalqaṭār* (the yellow type, according to Ibn Sinā) served in the preparation of suppositories for treating hemorrhoids. See *ibid.*, vol. I, part 2, pp. 449–454.

¹⁷⁴ *Jullanār* is the Persian for pomegranate flowers. According to Ibn al-Bayṭār, Galen describes these flowers as good for healing wounds and stopping bleeding due to their dry, cold temperament. He remarks that of all the doctors who wrote medical books not one failed to use these flowers. See *Ibid.*, vol. I, part 1, pp. 225–226.

In contrast to this mixture, he refers to another prescription as “effective with God’s help,” implying that he has not tried it himself, so it may be effective but there is no guarantee. This prescription includes ingredients similar to those mentioned above with a few slight changes, such as equal quantities of *zāj*, gall nut, pomegranate peel instead of pomegranate flowers, *rāsakht* (red antimony) and alum, *shabb* which is known as a blood clotting agent.¹⁷⁵

Removal of Haemorrhoids was also performed by cauterization with a white-hot iron, followed by application of antiseptics and emollients to help the burns to heal quickly. The medications recommended for this purpose include oils, fats, complex creams, egg whites, and camphor.¹⁷⁶ It is worth noting that most of the medications prescribed for treating Haemorrhoids in humans were similar in composition to those prescribed for Haemorrhoids in animals.

3. *Removal of Tissues and Growths from the Head and Face*

Surgical operations were performed on different parts of the face and head, such as the nose, ears, teeth and eyes, and in the case of hunting birds, also the beak. Many of them involved the removal of growths. The Mamlūk sources sometimes classify treatments that they define as belonging to the “ancients” in the category of external treatment without surgical intervention. This approach indicates that doctors from earlier periods tended to avoid surgical procedures or treatments that required invasive intervention in the patient’s body. The ancients were clearly limited in surgery compared with the impressive development in the Mamlūk period as revealed in Abū

¹⁷⁵ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 309. Alum—*Shabb* was used by doctors to treat wounds, and particularly to stop bleeding. It is a kind of mineral composed of potassium sulphate and aluminium sulphate and was used as a shaving stone because of its anti-bleeding properties. It also served to prevent bleeding during copulation when spread on a piece of wool and inserted into the vagina. It had many cosmetic uses, for example, it served as a deodorant when applied to the armpits, it was used to attach the teeth to the gums, to stop bleeding from the gums, remove minor skin growths, deal with white spots on the fingernails, and more. See Ibn al-Bayṭār, *al-Jāmi‘ li-mufradāt al-adwiyah*, vol. II, part 3, pp. 69-71.

¹⁷⁶ ‘*Al-mirham al-murakkab wa-bayāḍ al-bayḍ wa-kāfūr wa-duhn*’: Amīn al-Dawlah Abū al-Ḥasan Sa‘īd b. Hibat Allāh, *Kitāb al-Mughnī fi al-ṭibb*, p. 131. According to Ibn al-Bayṭār, the resin obtained from the camphor tree (*cinnamomum camphora*) served mainly as a smelling substance and was of great value in curing illnesses. Its natural character was cold and dry, hence it was used for treating hemorrhage, inflammation, and also as an antidote—theriaca (*tiryāq*) for poisons. See Ibn al-Bayṭār, *al-Jāmi‘ li-mufradāt al-adwiyah*, vol. II, part 4, pp. 296-297.

Bakr's writings. For example, in discussing *al-ʿankabūtah* (nasal polyp), a growth in the nasal cavity, Abū Bakr describes two methods of treating it. One, the method of the ancients, was mainly external and based on medications to be applied to the infected area. The other, which he describes as more effective, requires surgical intervention to remove the growth. The follow-up treatment consists of rubbing medical substances on the area of the incision in order to dry the wound quickly.¹⁷⁷

Eye surgery was more dangerous, because any damage to this delicate organ could impair the sight and lead to blindness. Nevertheless, the Mamlūk sources contain descriptions of fairly advanced surgical techniques to remove a membrane that grew in the eye socket and covered the lens, presumably pterygium. This condition was called *al-ẓufrāh* (or *ẓafarah*) because the hard membrane resembled a fingernail (*ẓufr*) that formed in the eye and impaired sight. Abū Bakr describes the operation to remove the membrane, listing the special instruments used, including a special needle and thread to pull the pathological membrane gently off the lens without harming it.¹⁷⁸

Eye operations were more common on hunting birds than on other animals. One of the routine procedures in their taming process was sewing the hawk's or falcon's eyelids in their first days of captivity. This operation, which was regarded by the falconers as essential for the taming process, was intended to subdue the bird and make it obedient to its trainers.¹⁷⁹ This was relevant mainly in the case of a fledgling, *urquwān*, ready for flight. We often read of severe damage to the bird's eyes, which was discovered only after the stitches were taken out, leading to the need for further treatment with creams and lotions to prevent infection. Most of the surgical treatments performed on eyes were accompanied by the use of creams and powders of various kinds in order to facilitate recovery.¹⁸⁰

4. *Surgical Treatment of Al-khuld in the Area of the Head*

Al-khuld considered one of the most serious diseases of equines, was a form of leprosy and its treatment required surgical intervention. *Khuld* ('mole'), is a metaphorical expression based on the similitude between the skin damage to mole's effect on the earth. It was usually manifested in purulent sores that were hard to get rid of. The parallel condition in humans was

¹⁷⁷ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 175.

¹⁷⁸ *Ibid.*, pp. 165-167.

¹⁷⁹ Al-Baladī, *al-Kāfi fī al-bayzarah*, pp. 125-126.

¹⁸⁰ *Ibid.*, pp. 249-251; Ibn Qushtumur, *al-Qānūn al-wāḍiḥ*, K.K., Ms. 978, fols. 101v^o-102r^o.

called *judhām*—leprosy, and the veterinary sources also compare the two diseases.¹⁸¹ During the operation the veterinary surgeon had to cut below the jaw area, using a sharp knife or a sharp cautery. Abū Bakr describes the operation, saying that it is highly delicate because it is in the area of the head. He writes that the surgeon first has to make a long narrow incision without penetrating beyond the epidermis, and extract the pus and fluid accumulated in the outer part of the sore. Then he must proceed slowly, entering more deeply into the tissues until he reaches the root of the growth or sore, *al-khuld*, which he can then excise carefully. In this operation, Abū Bakr emphasizes, the surgeon has to be very careful not to scratch the windpipe or one of the arteries that pass through both sides of the neck and below the jawbones, adding that accidental injury to one of the arteries is less serious than injury to the windpipe, which is liable to kill the animal. He explains that the injury to the arteries is less dangerous because the bleeding stops and the arteries close without any trouble. Another piece of advice that Abū Bakr offers to the surgeons is to take great care to remove the growth (*al-khuld*) in its entirety, without leaving any trace of it in the body, otherwise it might reappear. The surgical treatment is accompanied by cauterization with a white-hot iron in the site of the growth in order to prevent the development of a new growth. He also suggests cauterizing in other parts of the body as part of the treatment of this disease.¹⁸²

5. *Treatment of the Bird's Beak, Extraction of Canines and Treatment of Teeth, Gums and Tongue in Horses and Camels*

Another organ of hunting birds that occasionally required surgery was the beak, when it grew excessively and had to be cut and filed so as to make the bird more comfortable and avert severe headaches, which were apt to develop in such cases. The veterinary authors ascribed excessive growth of the beak to the conditions of captivity in which the bird lived, because it did not happen in the wild where the birds sharpened their beaks on the hard surfaces of stones, rocks or tree trunks, which they could not do in captivity.¹⁸³

Operations on the teeth and jaw were sometimes performed on bigger animals, mainly extraction of misaligned teeth that made it difficult for the animal to grind its food. The sources mention two types of teeth that were

¹⁸¹ See, for example, al-Malik al-Ashraf, *al-Mughnī fī al-bayṭarah*, pp. 78-79.

¹⁸² Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 207.

¹⁸³ Al-Baladī, *al-Kāfi fī al-bayṭarah*, p. 248. For the diagnosis of headaches, see chapter VI.

extracted in a similar manner, one called *rā'il* or *rā'ul* (pl. *rawā'il*) = wolf's tooth (a tooth that grows disproportionately above the molars in the upper gum), and the other *sinn al-faḍūl* or *ḍirs al-faḍūl* (a tooth that grows between the molars in the upper or lower jaw, from inside or outside the gum).¹⁸⁴ The extraction of such teeth required specialized skill, and in particular the veterinary surgeon had to know how to use for this purpose a special hooked tool (also depicted graphically).¹⁸⁵ A tool in the shape of a small ladder was designed to help the surgeon to open the mouth of the horse, mule or donkey.¹⁸⁶ Aging camels suffered from similar problems and the veterinary surgeon had to cut, file, and sharpen their canines in order to facilitate eating.¹⁸⁷

Another surgical operation performed on animals was excision or partial excision of the tongue, in the belief that this would cure severe illnesses such as madness or rabies.¹⁸⁸ Abū Bakr describes the hot, sharp instrument that was used in performing this operation.¹⁸⁹

6. Skin, Feather, and Talon Implants in Hunting Birds

Hunting birds were prone to injury from wild birds that they were hunting or from other raptors that tried to snatch the prey from their mouth, and the veterinary literature describes the surgical treatment that was required for these injuries. For a very deep wound with damage to the stomach or another internal organ, the surgeon had to use a sharp pointed needle threaded with fine woollen thread. If the wound reached the bird's gizzard, he had to use a powder obtained from a plant called *'ushbat al-jinn* (the jinn herb), scattering it over the wound after sewing it up.¹⁹⁰ One of the veterinary manuscripts features detailed instructions for a more complicated surgical procedure to deal with a gaping wound that the doctor cannot close because part of the epidermis is missing. It is complicated because the surgeon had to replace the missing skin immediately with skin taken from the same body part of another bird killed especially for the purpose. The transplanted skin had to be sewn with a fine woollen thread on both sides of the cut, and then sprinkled with *'ushbat al-jinn* powder to

¹⁸⁴ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 31-33.

¹⁸⁵ *Ibid.*, p. 183.

¹⁸⁶ *Ibid.*, p. 189.

¹⁸⁷ Al-Malik al-Ashraf, *al-Mughnī fi al-bayṭarah*, p. 194.

¹⁸⁸ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 187.

¹⁸⁹ *Ibid.*, p. 187.

¹⁹⁰ See Cambridge University Library, Cambridge, *Ms. Or. 464*, fol. 60r^o.

expedite healing and prevent infection. For a wound inflicted by a crane, the writer advises covering it with minced 'cow fat' before stitching and closing the wound. He also adds some other prescriptions for treating the same problem, using materials such as copper shavings.¹⁹¹

The description of this operation and the matching of the skin with the 'donor' testifies to the writer's basic understanding of skin transplants, expressed particularly in his insistence on swift performance of the operation and immediate use of the skin taken from the other bird's body. These instructions are evidently based on experience, and it is surprising to see the veterinary surgeons' high professional level in dealing with skin transplants although they lacked the knowledge existing today on the matching of tissues or rejection of skin grafts, anti-rejection agents and, of course, the sophisticated equipment accessible to veterinary surgeons today.

Hunting birds sometimes needed transplants to replace broken wing or tail feathers. One falconry author explains how such transplants should be performed, taking the utmost care in the choice of suitable feathers, for which it is essential to find a donor bird of the same type. Al-Baladī devotes a long chapter to feather grafts, describing the various methods that he finds satisfactory. He emphasizes that he performed feather transplants on a Peregrine and a kestrel with great success. In all these operations it was necessary to ensure that the feathers chosen for grafting were taken from the same part of the wing or tail as the part that was to receive the transplant. Another possibility was to use a feather taken from one of the larger birds, such as eagles, cranes or ducks, and in this case it was important to cut and sharpen the feather to make it resemble the original feather (the author uses the verb *handama*, meaning in this context to remodel the feather).¹⁹²

There were three levels of transplant, according to the broken part of the original feather. The easiest level was when the base and part of the feather were undamaged, and the transplant consisted only of the external part of a new feather. The surgeon would dip the new feather into special substances such as heated fish glue and garlic juice, and then insert its shaft into the old one and tie it twice, above and below the area of the break. The second level was when only the base of the feather remained and it

¹⁹¹ This material, as well as glass dust, was used for treating purulent wounds in the bird's foot or in one of its talons. The glass dust was mixed with goat's spleen and egg whites, minced to a paste, spread on a bandage and applied to the wound. See Cam. U.L., *Ms. Or. 464*, fol. 60v°.

¹⁹² Al-Baladī, *al-Kāfi fi al-bayzarah*, pp. 329-330.

was necessary to graft a whole new feather. In this case, the operation had to be performed in two stages: first, the surgeon had to pull out the original base and insert the new feather into it, and then plant it back in its original place. In the third level of difficulty, the surgeon had to use a special technique to insert the new feather into the original base using a sharpened stick and inserting one end into the base and the other end into the new feather. In all these cases it was necessary to use a glutinous substance such as fish glue (*gharā samakī*) to immobilize the area and complete the transplant process.¹⁹³

Falcons and hawks sometimes needed talon transplants, and this operation is described in the sources similarly to the feather transplants. In this case, too, the donor bird had to be of the same species as the recipient of the transplant.¹⁹⁴

F. GYNECOLOGICAL SURGERY

1. *Preparatory Procedures for Impregnation*

In this procedure the veterinarian cuts part of the mare's labia minora and then inserts his hand into the cervix and attempts slowly and gently to open the womb. Al-Malik al-Mujāhid explains in detail how the veterinarian has to act. He has to massage the area in order to widen it, and every time it widens a little he has to remove his hand and wash the place thoroughly, clearing out the black fluid that has accumulated inside until the water comes out perfectly clean. This treatment causes the womb to expand and the mare does not resist if it is done very gently. After the washing, the veterinarian prepares a mixture composed of musk, one seed of musk, a little saffron, camphor seeds, two spoonfuls of jellified honey, seven pepper seeds, all minced together and mixed with honey and rosewater. In this mixture he soaks a ball of wool shaped like a lemon, ties it with a strong long thread, inserts it through the vagina and plants it in the womb, the "child's house." Before inserting this pad the veterinarian attempts to open the cervix by inserting one finger, and while guiding the pad inside he holds the end of the thread in his hand and pulls it out as far as the base of the tail, where he ties it firmly. This pad is left inside the womb for a whole night and then an attempted mating is carried out with a breeding stallion in the early morning hours, or in the evening if the treatment was applied

¹⁹³ *Ibid.*, p. 330.

¹⁹⁴ *Ibid.*, p. 306.

early in the morning and the pad left in all day long. As soon as the stallion mounts, but before penetration, the veterinarian pulls the thread and removes the pad. This treatment is supposed to help the semen to enter the womb directly, and the natural contractions of the womb hold the sperm inside, leading to conception and a successful beginning to the pregnancy, says al-Malik al-Mujāhid.¹⁹⁵

2. *Removal of a Dead Foetus from the Womb*

The removal of a dead foetus from a mare's womb was one of the most dangerous operations in veterinary surgery, because it carried a high risk of causing the mother's death. Such a problem might arise when the mare was about to deliver but the foetus was in the wrong position, preventing its smooth and easy emergence, a situation that might endanger the mother. The veterinary surgeons generally preferred to save the mother rather than a foetus that was at high risk, reasoning that the mother could conceive again and bear another foal.

Some sources feature detailed descriptions of the various instruments and medical equipment that were needed for these Caesarean operations. The conventional method was to attempt to remove the foetus intact. The most complicated treatment in connection with reproduction is undoubtedly removing a dead foetus from its mother's womb. The writers discuss various conditions, severe or mild, of the pregnant mare. The main difficulty concerned complications that might occur as a result of wounds caused to the mare in the process, as the veterinarian had to use sharp tools such as knives and scissors to penetrate the womb and cut away the foetus lodged there. We sometimes find detailed descriptions of the removal of a dead foetus, and also accounts of veterinarians who succeeded in removing a dead foetus from its mother's womb without cutting anything, sparing the mother considerable suffering and severe complications, for which they received a handsome reward.¹⁹⁶

¹⁹⁵ Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, pp. 269-270; al-Malik al-Ashraf, *al-Mughnī*, pp. 149-150.

¹⁹⁶ Abū Bakr tells of his uncle al-Jammāl Maḥmūd, who treated one of the mares of a Khawārizmī emir and succeeded in removing the foetus without using any sharp tools. His method was to grasp the mare by her nostrils and prevent her from breathing, and then suddenly to release the nostrils. This action forced the mare to breathe deeply as if she had been drowning, which caused the foetus to be expelled forcibly, sparing a painful surgery. As a reward for this special treatment he received 12,000 *dirhams*. See Abū Bakr al-Bayṭār, *Kashif*, vol. II, p. 319.

However, sometimes its position in the uterus rendered this impossible and a more complicated procedure was required. In this operation, the surgeon had to insert his whole arm into the mare's uterus (first oiling his arm), holding in his closed fist a sharp knife with which to cut off parts of the foetus and take them out, bit by bit.¹⁹⁷ The veterinary authors discuss the danger involved in this kind of operation and the high probability of piercing the lining of the mare's womb while cutting the foetus, leading to severe hemorrhage and even death of the mare.¹⁹⁸

Another treatise from the Mamlūk period, by the king al-Malik al-Ashraf al-Rasūlī, also deals with the situation of a dead foetus in the mare's womb, requiring immediate intervention by the veterinary surgeon. Here, too, the doctor inserts his hand with a special knife and in order to cut up the foetus. The doctor has to begin cutting the foetus from the area of the head and shoulders, the widest part of the body, which prevents its smooth emergence from the vagina. This is described a difficult operation, and the doctor has to search carefully and touch each part of the foetus to make absolutely sure of identifying the part to be cut. After removing the dead foetus, the doctor has to give the mare medication, including suppositories and oils, and cover her with a cloth to protect her and help her to recover quickly.¹⁹⁹

It is most instructive to compare the above-mentioned methods of removing a dead foetus, described in veterinary treatises of the Mamlūk periods, with earlier writings on the same subject. Ibn al-ʿAwwām's twelfth-century book, summarizes veterinary knowledge that had reached him from the classical heritage (Greco-Roman-Byzantine) and from Indian and the Persian sources. It reveals that knowledge regarding this issue had been, at that stage, quite limited. Ibn al-ʿAwwām only mentions a specific treatment, attributing it to Mūsá b. Naṣr, who suggested using a piece of cotton wool soaked in a poisonous substance containing red arsenic and inserted into the womb. With this, Ibn al-ʿAwwām sums up all the treatment suggested by the doctors of earlier periods, saying that these doctors declared that this poison was effective for treating the problem in question and inducing abortion.²⁰⁰ Apparently, there was no attempt at surgical intervention to remove the foetus, and certainly no mention of the many prob-

¹⁹⁷ A detailed description of this surgical procedure appears in Abū Bakr's book, where he describes the operation performed by his uncle and his brother on one of the Mamluk sultan's mares. See Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 317-319.

¹⁹⁸ *Ibid.*

¹⁹⁹ Al-Malik al-Ashraf, *al-Mughnī fi al-bayṭarah*, p. 153.

²⁰⁰ Ibn al-ʿAwwām, *Kitāb al-Filāḥah*, vol. II, p. 625.

lems that might arise as a result of the death of the foetus in the mother's uterus, as described in the Mamluk sources. Nor is there any mention in Ibn al-ʿAwwām's book of the effect of different positions of the foetus in the uterus. We may safely say that the Mamluk veterinary surgeons had reached a higher level in surgery and gynecology.

3. *Treatment of Uterine Prolapse*

When the veterinary surgeon failed to relocate a mare's prolapsed uterus by simple methods such as pushing it up with the hand or pressing in different ways, he had to resort to surgical treatment. For this operation he would lay the mare on her back, raise her head and pour into her mouth boiled water containing a muscle relaxant such as chamomile and melilot (melilotus, sweet clover)—*iklīl al-malik*.²⁰¹ After cleaning the womb thoroughly he would then introduce special medications such as a mixture of oil, strong wine, and pomegranate peel, cooked to form a pulp. Gently pushing the womb inside, he restored it to its place and stitched up the vulva, leaving a small opening for the mare to urinate. Subsequently, he rinsed the site of the operation, especially the stitches, with a solution containing burnt bay leaves mixed with wine, repeating this action for twelve consecutive days, after which he removed the stitches and the air bubbles that had accumulated underneath them and bandaged the area thoroughly. Throughout this period the mare was served food of excellent quality in order to expedite her complete recovery.²⁰²

4. *Treatment of ʿIkhtilāṭ*

Another gynecological problem that was treated with surgery was *ikhtilāṭ*, a condition in which the mare urinated while being ridden. It was defined more as a behavioural problem than an illness.²⁰³ Abū Bakr explains that this behaviour is improper and undignified, particularly in the presence of many people. To deal with this, he suggests using a sharp instrument called *khalāl*, a kind of stick used for piercing holes in the body, made either from the horns of an animal or from metal or wood. He states that both kinds are used by doctors, who find them easier to use than other methods of

²⁰¹ See figure 43.

²⁰² Anonymous, *al-Jawād al-ʿarabī*, p. 295; Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 315.

²⁰³ Abū Bakr states that this occurs when the anus and the urethral orifice are connected, perhaps because of the large penis of a breeding stallion, or perhaps due to a birth defect. It could also be the result of the young mare mating at a very early age. See Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 73.

puncturing animals' bodies. One end of the instrument was rounded and the other was sharp, and with this sharp end the surgeon had to make an opening between the mare's vulva and anus and then sew it up. Abū Bakr quotes several veterinary surgeons who say that when the mare is still in a state of *ikhtilāṭ* and the wound is still fresh it should be sewn up with a cotton thread and a special needle, and then repeatedly sprinkled with anti-bleeding and healing powders until a scar formed and the wound healed and closed completely.²⁰⁴

G. CASTRATION

In his book, *Kitāb al-Ḥayawān*, al-Jāḥiẓ, the ninth-century *adab* author, devoted a chapter to the issue of castration, presenting the opinions of those in favour and those who opposed it.²⁰⁵ Both these groups found support for their arguments in the Hadith traditions attributed to the Prophet. Those who opposed castration spoke of it as an act that causes irreparable and unnecessary damage to the animal and incurs divine retribution on the perpetrator. They emphasized that animal doctors were forbidden to cause any damage to animals, whether serious damage like castration or slight damage like cutting a tail, which apparently was common practise with dogs. Al-Jāḥiẓ wrote that cutting off a horse's tail was forbidden because it permanently changed the nature of its body, therefore, anyone who cut off a tail would face judgment before the creator. In contrast, the proponents of castration treated it as a medical issue, like phlebotomy or cauterization for medical purposes. Therefore, they saw castration as religiously permissible because it was intended for the good of the animal. They quoted the religious dispensation that permitted castration for the purpose of curing and helping the animal, comparing the benefit that animals derived from veterinary treatment to the benefit that humans derived from religion.²⁰⁶

At any event, surgical castration of animals, as of humans, was practised from ancient times, and many of the classical sources that were passed down to the Muslims and translated into Arabic contained abundant in-

²⁰⁴ *Ibid.*, p. 313.

²⁰⁵ Al-Jāḥiẓ, *Kitāb al-Ḥayawān*, vol. I, pp. 98-110.

²⁰⁶ The practise of branding animals for identification purposes, particularly on the forehead, was also forbidden by religious ruling. Some of those who shared this approach were even stricter about injuring animals and forbade making any irreversible change in the body. See *Ibid.*

formation on the conventional methods of castration. The fact that it was forbidden by religious law, or at least decried by many traditions attributed to the Prophet, did not prevent many veterinary surgeons from performing it. In the Mamluk period castration of animals became a common practise, described in great detail in the contemporary veterinary sources. In fact, castration is a surgical operation in the full sense of the word and it requires great skill and precise anatomical knowledge of the male genitalia. The veterinary surgeon had to have expert knowledge on the urinary ducts and the adjacent blood vessels. The veterinary sources describe the surgical tools needed for this operation, including knives and white-hot irons for cauterizing the area during and after the operation in order to stop or prevent blood spurting from arteries or veins that were cut during the procedure.²⁰⁷ The conventional procedure was as follows: first, the horse's forelegs and hindlegs were tied and he was laid on his back.²⁰⁸ Then the scrotum was cut open and the blood vessels behind the testicles were tied immediately. To stop the bleeding and hasten the animal's recovery various substances were applied, such as hot oil and cream containing heated minced garlic.²⁰⁹

The issue of castration according to religious law accentuates the difference between the "scholarly" authors, who also wrote veterinary treatises, and others, who were more focused on the practical aspects of medical treatment of animals. The former allocate an important place to the subject, citing all the evidence that castration is prohibited by Muslim law. They quote many sayings of the Prophet stressing that castration is reprehensible. Al-Dimyātī, for example, being a Cadi, emphasizes the prohibition in his book on horses and quotes the Prophet's saying that castration of horses is forbidden.²¹⁰ On the other hand, the writers who are not opposed to castration either ignore the religious strictures or barely mention them and subsequently revert to a strict scientific medical approach.²¹¹ They emphasize the benefits of castration, particularly to old

²⁰⁷ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 327; al-Malik al-Ashraf, *al-Mughnī fī al-bayṭarah*, p. 160; al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, pp. 273-274.

²⁰⁸ For similar position, see figures 43 and 48.

²⁰⁹ *Ibid.*

²¹⁰ Al-Dimyātī, *Faḍl al-khayl*, pp. 30-33; Bodl. L., Ms. Marsh 389, fols. 35r^o-37r^o. For the Hadith traditions forbidding castration of animals such as horses, camels, and sheep, see Aḥmad b. Ḥanbal, *Musnad Aḥmad b. Ḥanbal*, vol. II, p. 24.

²¹¹ See, for example, al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 97; Amīn al-Dawlah Abū al-Ḥasan Hibat Allāh, *al-Mughnī fī al-bayṭarah*, Ms. at Dār al-Kutub, Cairo, *Ṭibb, Microfilm no. 47483*; B.L., Ms. ADD. 7513, fol. 51r^o; Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 325-329; al-Malik al-Ashraf, *al-Mughnī fī al-bayṭarah*, p. 160; al-Dimyātī, *Faḍl al-khayl*, pp. 30-33.

horses or mules,²¹² arguing that it is performed to cure certain diseases and mainly to solve behavioural problems. The writer of one veterinary manuscript suggests castration as a method of treating a biting horse, but only as a last resort after trying all the other methods listed in his book, such as retraining or punishment.²¹³ In another treatise castration is recommended as a treatment for rabies or madness.²¹⁴

Among his arguments regarding the benefits of castration Abū Bakr mentions historical examples of rulers who gelded their horses in order to calm them down and enhance their battle skills.²¹⁵ He refers to the change that takes place in the horses' behaviour after castration; it makes them quieter and more obedient to their trainers, therefore they are also more suitable for special tasks such as ambushing or for observation of enemy territory.²¹⁶ In point of fact, we have no evidence that horses who served in warfare were gelded as part of their preparation for battle, nor is it clear whether Abū Bakr refers on this point to the actual situation in his day or to a situation that existed in the past.

Abū Bakr describes four different methods of gelding, expressing disapproval of some of them. It appears that some of these methods were in common use in his day, and he declares that he himself has performed one of them. He even refers critically to his father's method, which he does not particularly recommend. The four methods are:

1. Surgery using a sharp heated iron instrument. A white-hot iron was used for this operation in order to stop bleeding from the large blood vessels that had to be cut in the process. For this procedure the horse was laid on his back with his legs raised in the air and the scrotum was tied at its base with a cotton thread or a hempen rope, *qunnab* or *qinnab*. Then the surgeon cut along the length of the scrotum with a sharp heated instrument, separating the testicle from the muscle tissues and the layers of fat surrounding it. He gripped the base of the testicle with special gelding forceps called *mishqāṣ al-khaṣā'*, and cut it from the base. Immediately

²¹² Al-Malik al-Ashraf, *al-Mughnī fī al-bayṭarah*, p. 160.

²¹³ B.L., Ms. ADD. 7513, fol 25r^o.

²¹⁴ Bodl. L., Ms. Pococke 360, fol. 120v^o-121r^o.

²¹⁵ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 327.

²¹⁶ A manuscript of Abū Bakr's veterinary book *Kāshif*, also known as *al-Nāṣirī* (B.N., Ms. Arab 2814) contains a reference to these two tasks of ambushing and observation which were assigned to geldings. He also adds some special characteristics of geldings that make them superior to those that are not castrated. For example, they have more stamina, they are quiet, and not given to loud braying, they are better able to tolerate hunger and thirst—all characteristics that certainly raise their value in warfare. See Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 384 (note 42).

after cutting and removing the testicle he dripped liquid tar on the base of the arteries in order to stop the bleeding. The second testicle was cut off in the same way. After the bleeding stopped the surgeon untied the cords that were bound tightly around the scrotum and rubbed all sides of the cut with oils, salt and garlic, both inside and outside. The author warns of the danger of excessive bleeding, which might prove fatal to the horse, saying that it happened to many horses because the surgeon who operated neglected to attend to it immediately. If the bleeding does not stop after tar is rubbed on the opening in the artery, the author suggests tying the blood vessels.²¹⁷

2. *Jabb*. According to Abū Bakr, this was the method that his father used under the scrutinizing gaze of the Mamluk sultan in whose court he worked. This method also involved laying the horse on his back, tying his legs, gripping the skin of the scrotal pouch and making an incision with a sharp knife, thus exposing the testicles and separating them from the surrounding tissues. In this case, too, the surgeon had to use forceps designed especially for the procedure. He cut the testicles away from the base and spread liquid tar on the opened arteries in order to stop the bleeding. Then, he spread oil, garlic and salt on both sides of the incision and covered the horse or dressed him in special trousers to prevent air entering the space left by the excised testicles. The incision in this method was deeper than in the previous one.²¹⁸

3. Crushing the testicles. To use this method, the surgeon started by rubbing the testicles vigorously to “put them to sleep,” in the author’s words. He could also use his teeth to nip the area lightly, causing a tingling sensation in the testicles until they “fell asleep.” In this operation the instrument used for gripping the testicles was called *mishqāṣ ifranjī* (Frankish forceps), perhaps indicating that the Arabs had learnt this method of gelding from the West. The “Frankish forceps” were made of wood, as opposed to the iron of the previous methods. Gripping the testicles tightly at their base, the surgeon tapped them lightly with wooden sticks and left them trapped for 24 hours or even two days if necessary, causing the testicles to dry up and eventually fall off without being cut. After the testicles had fallen off the horse was stood on his feet. Abū Bakr views this

²¹⁷ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 327. A veterinary manuscript translated by Thābit b. Qurrah from a Persian source features a method similar to that described by Abū Bakr. Besides the method, the early writer ascribes importance to the seasons of the year when castration is recommended, spring and autumn. Abū Bakr, on the other hand, attaches no importance to the season of the year. See B.N., *Ms. Arab 2810*, fols. 282r^o-284r^o.

²¹⁸ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 327-329.

method as extreme, remarking that it entails a risk that the testicles will swell and fill with purulent fluid, and perhaps burst, which could be fatal to the horse.²¹⁹

4. *Sall.* Abū Bakr describes this method as being really hard on horses but more suitable for castrating rams and bulls. During this operation the surgeon made the incision, exposed the two testicles and wrapped all the exposed major blood vessels around a stick until they were torn from the base. Then, he spread oil, salt and garlic on the area and dressed the animal in the special trousers described above, to prevent air from entering the vacuum created in the scrotum.

Besides these four methods Abū Bakr mentions another two, of which he does not approve. One of them involves not only removal of the testicles but the entire scrotal pouch. He states that this method is commonly used for castrating humans and is easier to perform, but more dangerous due to the risk of internal hemorrhage and of the blood vessels descending into the abdominal cavity, making it difficult for the surgeon to stop the bleeding. By the other method, the scrotal pouch is tied very tightly and left until the testicles are severed. This method was practised on horses, pack animals, bulls and rams, but Abū Bakr rejected it outright because of the terrible suffering it caused to the animals.²²⁰

Al-Malik al-Mujāhid, in his veterinary treatise, provides a more detailed description of the first method in Abū Bakr's list, remarking that it is suitable for castrating an aging horse. After laying the horse down on his back, they used three heated instruments to cut the scrotal pouch and expose the testicles, and then tightened forceps behind the testicles. But unlike Abū Bakr's method, they used three types of forceps in the following way: after tying the arteries with a silken thread (not cotton or hemp) to prevent bleeding, they cut the scrotum with one sharp instrument. With the second, they cauterized the external arteries, and with the third they cut the other blood vessels very quickly. As with other methods, they applied to the area anti-bleeding substances such as pitch (*zift*), olibanum (*lubān*) and *lāmī* [?]. They filled the vacuum left by the excised testicles with ground garlic and heated oil—*salīṭ hār*. Then, they performed two more cauterizations with a white-hot iron in a pattern of broad horizontal stripes on the tail. Finally, they untied the horse, dressed him in trousers to protect the oper-

²¹⁹ *Ibid.*, p. 329.

²²⁰ *Ibid.*, p. 329.

ated area, and walked him gently. The follow-up treatment of the surgical wounds consisted of spreading hot oil on them.²²¹

Al-Malik al-Mujāhid also describes a method that he claims is commonly used for castrating young donkeys. This is the *sall* method, which appears fourth in Abū Bakr's list. According to al-Malik al-Mujāhid, they laid the donkey foal on the ground, tied him with ropes, cut the scrotum and exposed the testicles without tying a thread around the scrotal pouch. Instead, they pulled the testicles out of the pouch and squeezed them hard, stopping the blood flow to them from the arteries. To prevent bursting of blood vessels, the surgeon tied the area behind the incision with a cotton thread. He cut the blood vessels that were connected to the testicles, using oil to prevent hemorrhage. The wound was subsequently filled with anti-bleeding and healing agents, such as a substance derived from the jujube plant. A smelling substance made from dried cow dung was also given to the donkey foal to smell.²²²

H. ANESTHETIZING, STABILIZING AND STERILIZING

The sophisticated surgical methods described in the Mamluk treatises clearly indicate a step forward in medical practise from the classical medicine of an earlier period, and furthermore, a higher level of veterinary medicine compared with human medicine of the same period, where we find no mention of procedures of this kind. One cannot imagine a medical practise that uses such invasive methods without taking into consideration the three factors which render such methods possible and also improve their effectiveness: the reduction of pain by using pain-killers and anesthetic or narcotic materials, the stabilization of the patient and the prevention of infection resulting from the surgical operation.

It should be emphasized that anesthetization is not mentioned separately as a first stage of the surgical operations described by the authors of the veterinary works. This may seem strange in view of the invasive character of the operations, the necessity to stabilize the patient and the need to prevent suffering from the animals, which is stated as a guiding professional principle in several works of this genre.²²³ Nevertheless, an examina-

²²¹ Al-Malik al-Mujāhid, *al-Aqwāl al-kāfiyah*, p. 273.

²²² *Ibid.*, pp. 273-274.

²²³ See above, chapter IV/F (Ethics). Cf. al-Khateeb Shehada, "Arab Veterinary Medicine, pp. 315-331. See also Abu Bakr's avoidance of certain procedures considered by him too

tion of the *materia medica* prescribed for use before and after the operations reveals that some of them have pain-soothing or even anesthetic properties, which were either added to the food or spread as a cream in the area to be treated. For example, henbane (*Hyoscyamus niger*, ar. *banj*), a plant known since antiquity as a narcotic,²²⁴ is mentioned by several authors.²²⁵ Opium is also mentioned in the veterinary literature as a food supplement, although, as far as I know, not in the context of surgical interventions.²²⁶ Coriander (*kuzbarah*), however, which is described in pharmacological a treatise as a substitute for opium and a pain-killing substance,²²⁷ does figure in the veterinary literature in relation to surgical operations, in combination with other pain-killing substances (myrrh, ar. *murr* and frankincense, ar. *kandar*).²²⁸ Medications that included substances considered to have pain-killing or soothing properties, such as oils produced from violet (*Viola odorata*, ar. *banafsaj*) and various sorts of rose (*Rosa*, ar. *ward*), melilot (*Melilotus officinalis*, ar. *iklil al-malik*), and various sort of myrobalan (*Terminalia*, ar. *ihlilaj*), are listed with reference to surgical operations.²²⁹ Abū Bakr provides a recipe including three plants that have similar effects, used for difficult operations and treatment of injuries: fenugreek (*Trigonella foenum-graecum*, ar. *hulbah*), linseed (*Linum usitatissimum*, ar. *bizr kattan*), and marshmallow (*Althaea officinalis*, ar. *khatmī*).²³⁰

The pain-killing and narcotic substances also helped to stabilize patients during surgical operations, but considering the great risk involved in brisk movements in the course of the invasive interventions and probably also the inability to monitor with great precision the quantities of narcotic substances to the patient, stabilization was also assured by tying the animal up before the operation. We have already mentioned the instructions concerning the tying up of equines before surgical interventions. These instructions are often rather detailed and even accompanied by illustra-

painful for the animals, Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 329.

²²⁴ Selma Tibi, *The Medicinal Use of Opium in Ninth-Century Baghdad*, Leiden-Boston: Brill, 2006, pp. 1, 4-28, 50, 73, 78, 164, 231, 238, 249, 285 etc.; Franz Rosenthal, *The Herb. Hashish versus Medieval Society Muslim Society*, Leiden: Brill, 1971, p. 19.

²²⁵ Al-Giṭrīf, *Kitāb dawārī al-ṭayr*, pp. 95, 114; Ibn Qushtumur, *al-Qānūn al-wāḍiḥ*, fols. 99r^o, 101v^o-102r^o; al-Ḥasan b. al-Ḥusayn (presumably), *al-Bayzarāh*, p. 76; al-Baladī, *al-Kāfi fī al-bayzarāh*, p. 288, note 1; Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 183.

²²⁶ Al-Baladī, *al-Kāfi fī al-bayzarāh*, pp. 239-240, 339, 256 (poppy—*bizr khashkhash*); Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 153, 395 (poppy—*bizr khashkhash*).

²²⁷ Ibn al-Bayṭār, *al-Jāmi' li-mufradāt al-adwiyah*, vol. II, part. 4, pp. 327-331.

²²⁸ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 395, 405; al-Baladī, *al-Kāfi fī al-bayzarāh*, p. 320.

²²⁹ Al-Baladī, *al-Kāfi fī al-bayzarāh*, p. 324.

²³⁰ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 397.

tions. For example, for several interventions, such as the treatment of uterine prolapse, castration and serious hernia, horses had to be turned on their back with their legs tied up.²³¹ The stabilization of birds was relatively easier, but interestingly, as we have mentioned, the use of opium is mentioned in the hawking and falconry literature. In the case of implants, the keeper is instructed to hold the bird carefully in his hands for some time following the operation.²³²

Though being unaware of the existence of microbes, judging by the professional literature, the veterinary doctors of the Mamluk period attributed great importance to the cleanness of the surgical instruments and of the wound or organ that came under surgical intervention. A sixteenth-century doctor, al-Anṭākī, emphasizes the need of the veterinarian to use clean instruments, insisting specifically on the care of the instruments and syringes used to draw blood, which the veterinarian must keep scrupulously clean and oiled, so as to prevent infection (*‘adhwa*).²³³ In the Mamlūk treatises, wine, vinegar, garlic and onion juice, fig sap, various sorts of salt and lime, were used, besides cold or hot water, to cleanse the surgical instruments before the operations. A needle used for sewing wounds had to be passed through fire, or could also be stuck in garlic for the same purpose.²³⁴ Pads and threads used during surgical interventions were also required to be clean.²³⁵ Similar products, combined with softening substances, were employed for cleansing the wounds or the place to be operated on.²³⁶ The use of cauterization, discussed above, may also be considered as a method of sterilization, but it is also recommended to treat the same area with cleansing powders after cauterization.²³⁷

The awareness of the importance of sterilization is reflected in the continuous care required from the animal keepers following the surgical intervention. Cleansing materials and drying powders had to be repeatedly applied for several days, to prevent contact with air or moisture and avoid the development of pus.²³⁸ However, the doctors are also warned against stitching and closing cuts in the skin, especially wounds caused by attacks

²³¹ *Ibid.*, pp. 315, 327, 349. See figures 43 and 48.

²³² Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 330.

²³³ Al-Khateeb Shehada, "Arab Veterinary Medicine," p. 325.

²³⁴ Al-Baladī, *al-Kāfi fi al-bayzarah*, pp. 301-302, 329; Abū Bakr al-Bayṭār, *Kāshif*, vol. II, pp. 123, 139, 141, 227; Anonymous, *al-Jawād al-‘arabī*, p. 295.

²³⁵ Al-Baladī, *al-Kāfi fi al-bayzarah*, p. 321.

²³⁶ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 131, 133, 139.

²³⁷ *Ibid.*, p. 133.

²³⁸ *Ibid.*, pp. 141, 143, 227, 247; al-Baladī, *al-Kāfi fi al-bayzarah*, pp. 324-325.

of wild animals, so as to prevent internal infection and accumulation of pus, *middah*, which cannot be drained after the cut is closed and the skin stitched.²³⁹ This method is still applied by Veterinarians today.

²³⁹ Abū Bakr al-Bayṭār, *Kāshif*, vol. II, p. 141.

CONCLUSIONS

The long journey that we have made has enabled us first and foremost to elucidate the characteristics of an important branch of the medical profession in all its theoretical and practical aspects, as reflected in the Arabic veterinary treatises of the Mamluk period. It also brought us somewhat closer to the people who were involved in treating and caring for animals, to their cultural and social background and their ways of acquiring their profession. Last but not least, our examination has unfolded the role in Mamluk society of the animals that were the subject of such sophisticated medical methods, as well as their various interactions with their human masters.

It has been observed that some of the older scholarly works that dealt with Islamic veterinary medicine claimed that it merely followed the classical and Byzantine models.¹ Yet, a recent study of one section of what is considered to be the oldest available Arabic text on hippology and hippiatry—that of Ibn Akhī Ḥizām (late ninth century)—has revealed that it shows no parallels to texts of late Antiquity and the medieval West, while obvious similarities with later Arabic treatises could be detected. The authors of that study concluded that medieval Arabic hippiatry had its own tradition.² The present research has revealed a more complex picture in this respect, since it has demonstrated that despite its independent development, based on professional experience, veterinary medicine in the medieval Arabic world also drew substantial elements from earlier traditions, especially the Greek one.

The scrutiny of the veterinary treatises written or rewritten in the Mamluk period does indeed reveal that the Arab veterinary science in that period was influenced by the classical Greek heritage, and even more so by the Byzantine one, but it also drew a great deal from the Indian, Persian and Armenian veterinary heritages. The care of dogs and other non-equine mammals, as well as works on the medicine of hawking and falconry do not occur at all in ancient Greek writings. Moreover, the Arabic treatises are much more detailed and comprehensive compared with the ones included in the *Corpus hippiatricorum Graecorum* (a compilation of Byzantine

¹ E.g. Ullmann, *Die Medizin*, pp. 217-222; Leclainche, *Histoire*, pp. 116-117.

² Veidenhöfer, Heide and Peters, "Zur Frage der Kontinuität," pp. 58-95.

texts). It is also worth noting that the early Arab heritage, particularly from the *Jāhilīyah* and early Islamic period, finds significant expression both in content and terminology in veterinary books, where the anatomy of the horse is described in great detail, along with extensive descriptions of all the signs that help in diagnosing animals' diseases.

The fact that veterinary knowledge in the Mamluk period drew from many cultural heritages did not confine the Muslim veterinary surgeons to using only methods and prescriptions inherited from former traditions. This is particularly evident with respect to the way in which the ancient Hippocratic and Gallenic theories, which were so dominant among physicians treating human beings, were perceived in the sphere of veterinary medicine. The authors of treatises on human medicine provide an explanation based on the dominant medical theory for almost every disease. In most of the medieval medical sources written in Arabic, such as the comprehensive treatise by the highly authoritative medieval writer on medicine, Ibn Sīnā, every illness is explained as the result of an imbalance of the humours. Ibn Sīnā also often points to the humoral quality that characterizes the temperament of the disease, which largely dictates the suitable treatment, not only for the disease's temperament but also for the specific temperament of the body part affected.

This attention to the smallest details concerning temperaments has no parallel in the veterinary treatises examined in this book. However, the degree of association between the humours and temperaments theory and animal ailments, their diagnosis and treatment is different, depending on the branch of veterinary medicine concerned. The horse doctors seem to attribute much less importance to the theory of humours and temperaments compared to the ones dealing with birds of prey. True, nobody dared to question openly the validity of the theory of humours, and there was hardly an author who did not devote a few pages to it. Yet, when it came to diagnostic methods and methods of treatment, the pragmatic approach seems to have guided the veterinarians who treated horses. They used medicines and other practical methods, expecting to achieve visible results. Only if these methods were unsuccessful did they turn to the classical theory and seek to restore the balance of the humours. In such cases the technique they adopted was mainly bloodletting, usually performed alongside other treatments. In the veterinary literature (in both branches, but especially so in horse medicine) phlebotomy is generally proposed as a last resort or a supplement to dietary regimes or drugs prepared from plants and minerals; it is rarely recommended as the exclusive treatment, and

sometimes even presented as involving risks, especially but not exclusively in the treatment of birds. The illnesses defined by the horse doctors as resulting from an imbalance of the humours were those whose causes they failed to detect, mainly internal diseases probably caused by viruses or bacteria, which were unknown to doctors at that time, or severe internal illnesses, whose sources could not be identified by the diagnostic tools existing in the Mamluk period.

What seems to be an independent development of Arabic horse medicine is also reflected in the highly sophisticated and precise knowledge of the horse's anatomy, with special emphasis on the skeleton down to the smallest bone, in much greater detail compared to anatomical descriptions of the human body of that period. In the framework of veterinary treatises, they also seem to be more detailed than those that appear in falconry treatises. Moreover, they are accompanied by attempts to explain the motor functions of the bones and joints, materials that are totally absent from the falconry and hawking literature. This trait can be attributed to the long idiosyncratic heritage related to horses in Arab culture.

Somewhat paradoxically, the keeping and treating of birds of prey for hunting, which did not originate in the Greek and Roman world,³ came to be more attached, as far as the medical treatment of those birds was concerned, to scientific theories of the Greco-Roman tradition. The question why veterinarians dealing with birds of prey proved to be more attached to these theories compared to the ones who dealt with horses and similar animals remains open.

In his studies of medieval Arabic writings on falconry and hawking, Detlef Möller detected two periods of original development, the first during the ninth and tenth centuries, and the second in the first half of the thirteenth century.⁴ In other words, according to this scheme, the Mamluk period was not one of much original contribution in this field. Without refuting the importance of the two "golden ages" of the falconry and hawking literature indicated by Möller, the present study also shows that, at least as far as the medical treatment of birds of prey is concerned, development continued also in the Mamluk period, which was not confined to the

³ François Viré, "La Fauconnerie dans l'Islam Médiéval (d'après les manuscrits arabes, du VIII^{ème} au XIV^{ème} siècle)," *La Chasse au Moyen Age. Actes du Colloque de Nice*, Paris-Nice: Les Belles Lettres, 1980, p. 189; Horst Niesters, "The Art of Falconry," *Game and Hunting*, ed. Kurt G. Blüchel, Köln: Könenmann, 1997, vol. I, p. 164; Kurt Lindner, *Beiträge zu Vogelfang und Falknerei im Altertum*, Berlin-New York: Walter de Gruyter, 1973, p. 111.

⁴ Möller, *Studien*, pp. 11, 107-114.

copying of old tractates, as is clearly demonstrated in the falconry and hawking tractate written by Ibn Mankali in the fourteenth-century, where the personal experience of the author in treating animals and his critical approach to former methods of curing falcons and hawks is very evident.

The methods of treatment presented in the veterinary literature range from those that seem feasible and were presumably used by veterinary professionals, to those that raise doubts as to whether they were actually used in the treatment of animals. The former group consists largely of methods based on the use of medical products developed with the help of the pharmacological knowledge of the time. It is not hard to discern in the text the tendency of Mamluk writers, particularly those concerned with the medical treatment of birds of prey, to express their attitude towards one method or another, attitudes of agreement, opposition or warm recommendation. They spread before us the entire range of prescriptions and methods used in treating a certain medical problem, those practised in earlier times and those used in their own days. These writers chose to include in their treatises prescriptions from the past even if they themselves did not use them, on the assumption that the aim of the veterinary treatise was to preserve knowledge from the past as well as to serve as a guide for the practical needs of the day. By interpreting their professional jargon, particularly the special formulas they used at the end of every prescription or medicine described, we can see whether they approved of it, doubted its effectiveness or rejected it completely.

The findings of the present study also support the statements of the scholars of Islamic veterinary science regarding the central place of pharmacology in Islamic veterinary science and its significant contribution in this field.⁵ The medications used in veterinary treatment were the product of a development that emanated from the desire to rely on the personal experience of pharmacists and doctors and also to update the range of available medicaments. This was reflected in the incorporation of new ingredients based on the discovery of various herbs, plants, minerals, animal organs and other components existing in nature, and by the writing of new pharmacological treatises. Sugar, for example, was of great economic importance in the Mamluk period, and trade in sugar was the monopoly of the sultan. This natural sweetener, obtained from sugarcane, was

⁵ Cf. Moulé, *La médecine vétérinaire arabe*, p. 9.

used extensively in the preparation of medicines and potions.⁶ In fact, it replaced honey, which was more traditionally used in pharmacy.

The descriptions of treatments based on the use of animals' body parts, such as the head, skull, tongue, or gall bladder of a dog, a frog's leg, the gall bladder of an ox, the flesh of an owl, hoopoe, ants, insects, worms, snails, internal organs of seals, cats, pigs, and so forth, were quoted from ancient sources which are explicitly or implicitly mentioned in the veterinary books of the pre-Mamluk period. This sort of *materia medica* seems to have declined in importance during the Mamluk period, when most of the medications were produced from plants and minerals, although animals' body parts still figure in the treatment of hunting birds. Furthermore, the veterinary surgeons of the Mamluk period rejected toxic substances such as arsenic, which was widely used in preparing poisons (not necessarily for healing purposes). The use of these substances apparently originated in knowledge derived from the classical or the Indian heritage, and the manner of using them was preserved in the early Arabic sources that came down to the doctors of the Mamluk period. Some of the Mamluk writers sharply criticize the use of poisons or substances that might be lethal for animals. The accumulated knowledge, the practical thinking and the inventiveness of the veterinary surgeons in the Mamluk period led them to repudiate such methods.

Leon Moulé, who, as we have seen, expressed his esteem for the progress of veterinary medicine in medieval Islam in the field of pharmacology, underrated the value of Islamic veterinary medicine with respect to surgery,⁷ and despite Emmanuel Leclainche's reference to several surgical treatments in which the Arab veterinary surgeons excelled,⁸ no research in this field has hitherto revealed the high level of sophistication that characterized the surgical practise of the Mamluk veterinary surgeons. The last chapter of the present book, discussing invasive methods of treatment, reveals an impressive variety of surgical interventions, ranging from relatively simple ones, such as surgical treatment of hooves or excision of skin growths, to more complicated and dangerous interventions, such as delivering a living or dead foetus from a mare's womb to save her life, repositioning a prolapsed uterus, a special hernia operation to sew up part of a wide

⁶ On Mamluk sugar production, see Mohamed Ouerfelli, *Le sucre. Production, commercialisation et usages dans la Méditerranée médiévale*, Leiden / Boston: Brill, 2008, pp. 54-67, 77-102; on its pharmaceutical uses, *ibid.*, Ch. VIII, pp. 503-567.

⁷ Moulé, *La médecine vétérinaire arabe*, pp. 8-9.

⁸ Leclainche, *Histoire*, p. 117.

opening that had formed between the anus and the urethra of a mare, orthopaedic procedures to remove fragments of broken bones, or the removal of parasites and foreign bodies from the gullet. An outstanding example of these people's innovativeness is the use of large black ants for stitching an internal wound in a horse's abdomen in order to avoid infection of the area. This method, which was probably invented by veterinary surgeons who sought a substitute for regular sewing with a thread, enabled them to close the wound completely and ensure rapid healing free of infection. In bird surgery we may mention the treatment of broken wings and implants of talons and feathers. Not a few of these methods were invented by Mamluk veterinary surgeons. Their anatomical, and to some extent also physiological, knowledge enabled them to perform operations that their predecessors had not known or had not dared to try.

Surgical treatments that involved cutting the skin and penetrating the layers of fat and muscle were performed in conjunction with drugs to stop bleeding and prevent infection after closing and stitching the wound. The surgeons had to possess expert knowledge of the different types of thread needed for different cuts, in addition to knowing how to match the operation to the different animals. They ascribed great importance to the methods they had learnt for preventing, or at least reducing, the animals' pain and suffering during the operation and after it, by using pain killers and narcotic materials. Here we see one of the highest points in Mamluk veterinary medicine, and it is especially remarkable in view of the unprecedented risks taken by the veterinary surgeons of the Mamluk period, risks that led to great advances in veterinary medicine.

The Mamluk veterinary sources emphasize that strict attention to hygiene and constant efforts to protect wounds from infection are a major issue in the treatment of infectious diseases. Antiseptics such as vinegar, certain types of oils, salts, wine, water and soap are mentioned frequently in the context of treating wounds and surgical intervention. Although they do not always state explicitly that the purpose is to avoid infection of wounds and cuts, it is clear that the methods described were based on the accumulated experience of veterinary surgeons who had treated wounded animals and understood that cleanliness and disinfection helped the animal's recovery. Some of the antiseptic substances used during the Mamluk period are known and used to this day. In addition, the methods used by Mamluk veterinary surgeons for covering and treating wounds and cuts are estimated to be better than those described in earlier sources. This finds expression in their repeated warnings against the accumulation of dirt,

and the development of pus or discharges from the body in the area of wounds or cuts. They also warn of the danger of exposing wounds to flies, which might cause sepsis and exacerbate the situation.

Wounds caused by carelessness in shoeing horses and other pack animals occupy a major place in Mamluk veterinary treatises. The treatment of such wounds was at the core of the veterinary surgeon's work and special emphasis was placed on the caution required in shoeing animals. In particular, the texts advise caution in choosing shoes; they describe the various types of horseshoes and stress the importance of matching the thickness of the nails to be used, filing the shoes and preparing the surface of the hoof to receive the metal shoe. According to the fourteenth-century veterinarian, Abū Bakr al-Bayṭār, the veterinary surgeon's proficiency is measured by his skill in attaching special shoes designed for the specific role of each animal, whether horse, donkey, or mule. In this context it is worth noting Abū Bakr's detailed descriptions of the types of shoes that were used in that period and his mention of certain types that were the speciality of his father, who had served as court veterinarian to several Mamluk sultans.

The veterinary writers sometimes compare the animal body to the human body, both in terms of anatomy and physiology and in the similarity of the medication and treatment applied to them. The writers of hippiatry books, for example, classify the horse's body parts similarly to the conventional classification of the human body, emphasising in particular the classification of organs according to their physiological functions and the similarity between the two creatures.

Apart from this classification by physiological function, which does not match the classification of organs that is recognised today, the veterinary writers also attempted to explain the physiological similarity of horses and humans by the functions of the senses, known as *al-qiwá*. According to this explanation, the horse had the same five senses as human beings: hearing, smell, taste, sight and memory (the sense of touch is not mentioned in this context). This attempt to explain the animal's bodily functioning by comparing it with human physiology was the basis for several scientific insights in veterinary medicine. Paradoxically, the veterinary sources reveal that, despite the attempts to compare the horse's body with the human, the veterinary experts' accumulated knowledge about the horse and other animals they treated surpassed the knowledge possessed by doctors of humans. It may be that the 'sacredness' of the human body as opposed to the 'impurity' of animals prevented the kinds of experimentation on humans that facilitated the growth of anatomical and physiological knowledge

on animals, which served as a springboard for the development of veterinary medicine.

As regards the similarity between treatment recommended for humans and for animals, the veterinary literature refers to a broad variety of diseases that are common to both and for which the same treatments are recommended as effective for both. The general medical literature also mentions some instances when medication prescribed for humans is described as being suitable for animals as well. Among the treatments defined in the veterinary sources as effective for humans we find one suggested by Abū Bakr for treating leprosy (*baraṣ*),⁹ a severe disease that infects both humans and animals. For treating alopecia, known as “fox disease” (*dā’ al-tha’lab*), one writer recommends medicines that he defines as “effective for animals and humans.”¹⁰ Even in the case of broken bones we sometimes find mention of an adhesive or fixative defined as “suitable for treating broken bones in both humans and animals.”¹¹ Similar prescriptions concern rabies. This perceived similarity between illnesses that affected humans and animals was explained by the argument that diseases originating from similar causes attacked bodies with similar physiologies.

The few veterinary surgeons whose names are known to us from the sources cited in this book belonged to the group that was employed in the royal courts and all of them were Muslims, which is unusual in view of the fact that in general medicine Christian and Jewish doctors worked side by side with Muslim doctors in Mamluk society. These veterinary surgeons were a select group of professionals who served in the court of the Mamluk rulers. Abū Bakr al-Bayṭār, the chief veterinary surgeon, had learnt the profession from his father, whom he succeeded as veterinary surgeon to the Cairo court. This is a typical example of the tradition of handing down a profession from father to son. However, apart from the veterinary surgeons in the sultan’s court, there were others who chose to engage in this field regardless of their high social status. Sultans, governors, kings (such as the two Yemenite ones), senior viziers, military commanders and high-ranking officers did not balk at treating animals, although they were not actually defined as veterinary surgeons. The hunting and falconry books set out the rules of behaviour that were subject to the social framework of the Mamluk elite. These stringent rules, which were binding upon the participants in hunts, expressed the exclusive character of this activity, and

⁹ Abū Bakr, *Kāshif*, vol. II, p. 123.

¹⁰ *Ibid.*, vol. II, p. 137.

¹¹ *Ibid.*, p. 409.

those permitted to take part in this social “game” enjoyed high social status. Thus we see an occupation that carried prestige and importance in Mamluk society, and consequently people of high social status engaged in it or revealed expertise at a professional level.

Although most of the veterinarians active around court took care of superb horses and excellent hunting animals, such as hawks, falcons, dogs and cheetahs, their knowledge was not confined to such animals. There is ample evidence that the treatment administered to a horse suffering from a particular illness was usually applied also to donkeys and mules. The veterinary professionals in the court also treated exotic animals of various kinds (e.g., lions, elephants, giraffes etc.) that were brought to the court in gift exchanges between rulers.

As well as the veterinary treatises written by people who were involved in the profession, there were also some written by scholars who took an interest in this field, partly in response to the great demand for such books. Al-Dimyāṭī was one of the more outstanding of this group due to his broad theological education in preparation for the role of Chief Cadi. His veterinary treatise, *Faḍl al-khayl*, one of the books most extensively studied in the Cairo colleges during the Mamluk period, illustrates the great interest at the time in scientific, literary, theological and medical material concerning animals, especially horses.

There is little remaining evidence from the Mamluk period concerning the work of veterinary surgeons in environments not directly related to the Mamluk elite. We may assume that their work was not confined to horses or hunting animals, and that they also treated farm animals such as donkeys, mules, oxen, cows and sheep, as can be surmised by the mention of a Jewish veterinary surgeon who worked in a village in southern Egypt and enjoyed a high status in the community. Other documents cast light on the activity of veterinary surgeons in the urban markets, where it was customary to require an expert opinion concerning an animal that was up for sale. Several contracts from that period concerning the sale of animals reveal that the work of the veterinarian in the markets included conducting a thorough medical examination of animals, such as horses, donkeys and mules, prior to their sale. This was important in order to thwart attempts by merchants to sell an infirm animal as a healthy one.

The ethical aspects of the profession, as they emerge from the veterinary writings, are of special interest. Abū Bakr, for example, discusses the behaviour expected of the veterinary surgeon, especially on the moral level. He is required to give free advice to the poor, to refrain from performing unnecessary treatments that do not bring relief to the sick animal, to treat

animals mercifully and compassionately and not to cause needless pain. In general, the veterinary surgeon is expected to behave according to the concept that every animal is a creature with a soul that suffers pain just like a human being, as embodied in the sayings of the Prophet, verses of the Koran, as well as in folk traditions. The veterinarian is therefore required to prevent unnecessary pain or injury to the animal during medical treatment.

The need for compassion and consideration for the animal's sensitivity are repeatedly stressed in these writings. The people who engaged in hunting and the care of falcons, for example, were required to maintain bodily hygiene, observe the rules of religious purity and to ensure a pleasant body odour out of consideration for the birds' sensitivity to cleanliness and smells. Other rules were set in order to enable the hunting birds to enjoy periods of rest from hunting, even while under the watchful eye of the falconer.

A salient expression of the relationships between animals and humans appears in the important book on the art of mounted warfare and hunting, written by Ibn Mankalī, a soldier who served in the Mamluk cavalry. He describes how the Mamluk warrior was prepared to sacrifice his life for his horse, expressing not only the importance of this animal as a tool of war but also the close bonds that developed between the rider and his horse.

The Mamluk veterinary treatises also emphasize the horse's importance in the political-religious context, as the main means of fulfilling the commandment of Jihad—fighting the enemies of Islam. The horse's prestige, rooted in the pre-Islamic heritage, rose higher in Islam, especially in the Mamluk state that conducted battles with the Mongols, conquerors of the Abbasid Empire, and also with the Crusader states. The veterinary writers present the treatment of horses as a vital element in fulfilling the religious duty of participation in Jihad. The need to subjugate the veterinary discussion to the religious framework even led the writers to refer to hunting and sport as preparation for Jihad.

The traditional approach (which still largely prevails) among scholars of the Medieval Islamic world tends to refer to the Mamluk period as an era of decline or stagnation in science and scholarship. Yet, at least as far as veterinary medicine is concerned, this book reveals a period of development and excellence unmatched in earlier and also later periods of Islamic civilization. The findings presented here may probably also lead to a re-evaluation by scholars of Arab and Islamic culture of other fields of intellectual, scientific and professional developments in the Mamluk period.

SOURCES AND BIBLIOGRAPHY

A. MANUSCRIPTS

i. *Dār al-Kutub, Cairo*

- Ibn al-Aḥnaf, Aḥmad b. al-Ḥasan, *Kitāb al-Bayṭarah*, Ms. *Ṭibb Khalīl Āghā* 8, Microfilm 46631
Ibn al-Aḥnaf, Aḥmad b. al-Ḥasan, *Kitāb Mukhtaṣar al-bayṭarah*, Ms. *Ṭibb Khalīl Āghā* 2934
Ibn al-Aḥnaf, Aḥmad b. al-Ḥasan, *Mukhtaṣar kitāb al-bayṭarah li-ibn al-Aḥnaf*, Ms. *Ṭibb Khalīl Āghā* 9, microfilm 5650 (dated 1103/1691)
Ibn Akhī Ḥizām, Muḥammad b. Ya'qūb, *Funūn 'ilm al-furūsiyah*, Ms. *Ṭibb* 1609, microfilm 31432
Ibn Akhī Ḥizām, Muḥammad b. Ya'qūb Naṣir al-Dīn, *Kitāb al-Khayl wa-al-bayṭarah*, Ms. *Ṭibb* 1200, microfilm 31249
Ibn Akhī Ḥizām, Muḥammad b. Ya'qūb, *Kitāb al-Furūsiyah wa-al-bayṭarah fī 'alāmāt al-khayl*, Ms. *Ṭibb* 1610, microfilm 32175
Ibn Ishāq al-Maḥallī, Ya'qūb As'ad al-Dīn (605/1208), *Kitāb al-Bayṭarah al-rūmiyah*, Ms. *Ṭibb* 1334, microfilm 48455 (dated 790/1388)
Ibn al-Khaytham, al-Ḥajjāj (al-Ḥaj 'Uthmān al-shahīr bi-Mulaḡī al-Ḥalabī), *Kitāb Ṭibb al-tuyūr*, Ms. *Ṭibb* 86 (*Ṭibb* 748), microfilm 31222
Āmin al-Dawlah, Abū al-Ḥasan Hibat-Allāh, *al-Mughnī fī al-ṭibb-kitāb al-bayṭarah*, Ms. *Ṭibb* 6, microfilm 47483
Abū Bakr al-Bayṭār, Badr al-Dīn b. al-Mundhir, *Kāmil al-ṣinā'atayn al-ma'rūf bi-al-Nāṣirī*, Ms. *Ṭibb Ḥalīm* 26, microfilm 55062
Abū Bakr al-Bayṭār, Badr al-Dīn, *Kitāb al-Bayṭarah-Kāmil al-ṣinā'ah*, Ms. *Ṭibb* 1218, microfilm 31352 (dated 863/1458)
Al-Malik al-Ashraf al-Ghassānī, 'Umar b. Yūsuf (d. 696/1296), *al-Mughnī fī al-bayṭarah*, Ms. *Ṭibb Taymūr* 377, microfilm 1605
Anonymous, *al-Bayṭarah*, Ms. *Ṭibb Khalīl Āghā* 8, microfilm 3931 (dated 605/1208).
Anonymous, *al-Bayṭarah*, Ms. *Ṭibb* 1219, microfilm 31946
Anonymous, *al-Durr al-muṭābiq fī 'ilm al-sawābiq*, Ms. *Ṭibb Khalīl Āghā*, microfilm 5758
Anonymous, *al-Bayṭarah*, *Ṭibb al-bayṭarah al-rūmiyah*, Ms. *Ṭibb* 914, microfilm 18611
Anonymous (Thaumnestes?), *Kitāb al-Bayṭarah- risālah fī ṭibb al-khayl*, Ms. *Ṭibb* 48, microfilm 47485
Anonymous, *Kitāb al-Bayṭarah*, Ms. *Ṭibb* 1219, microfilm 31402
Anonymous, *Kitāb al-Bayṭarah*, Ms. *Ṭibb* 1588, microfilm 31403
Anonymous, *Kitāb fī bayṭarat al-khayl wa-al-dawāb*, Ms. *Ṭibb* 800, microfilm 31226
Anonymous, *Mukhtaṣar kitāb al-bayṭarah*, Ms. *Ṭibb Khalīl Āghā* 10, microfilm 4220
Anonymous, *Mukhtaṣar kitāb al-bayṭarah*, Ms. *Ṭibb Khalīl Āghā* 13, microfilm 4171

ii. *Bibliothèque Nationale de France, Paris*

- Ms. *Arabe* 2810 (Arab. 1038)
Ms. *Arabe* 2813 (Suppl. ar. n°. 994)
Ms. *Arabe* 2814
Ms. *Arabe* 2815
Ms. *Arabe* 2816 (Suppl. ar. n°, 992)

Ms. Arabe 2817 (*Suppl.ar. n° 993*). [Ibn Munabbih, Wahab, *Kitāb fī ‘ilm siyāsat al-khayl*]
Ms. Arabe 2820
Ms. Arabe 2823
Ms. Arabe 2825

iii. *Bodleian Library, Oxford*

Ms. Arab d. 208
Ms. Bruce 26
Ms. Hunt. 136
Ms. Marsh 389
Ms. Marsh 487
Ms. Pococke 129
Ms. Pococke 360
Ms. Pococke 437

iv. *The British Library, London*

Ms. ADD. 14,055
Ms. ADD. 19,448
Ms. ADD. 21,102 (996)
Ms. ADD. 23,415
Ms. ADD. 23,416
Ms. ADD. 23,417
Ms. ADD. 25, 758
Ms. ADD. 7513 (441)
OR. 8187

v. *Cambridge University Library, Cambridge*

Ms. Qq. 124
Ms. Or. 464

vi. *Istanbul*

Köprülü Kütüphanesi, Istanbul, *Ms.* 978. [Ibn Qushtumur, Bughdī b. ‘Alī, *Kitāb al-Qānūn al-wāḍiḥ fī mu‘ālaḥat al-jawāriḥ*]
 Süleymaniye Kütüphanesi, Istanbul, *Ms. Fatih* 3566
 Süleymaniye Kütüphanesi, Istanbul, *Ms. Fatih* 3608, 3609
 Süleymaniye Kütüphanesi, Istanbul, *Ms. Faith* 4090
 Istanbul, Ayasofya, *Ms.* 3814

vii. *Escorial Library, Madrid*

Al-Asadī, *al-Jamharah fī al-bayzarah*, *Ms. Esc.* 903

B. MEDIEVAL SOURCES (INCLUDING TRANSLATIONS)

- Abū al-Fidā, al-Malik al-Mu'ayyad 'Imād al-Dīn Ismā'il Ibn 'Alī [sic] (672-732/1273-1331), *al-Mukhtaṣar fī akhbār al-bashar*, eds. Muḥammad Zaynahum wa- Muḥammad 'Azab wa-Yahyā Sayyid Ḥusayn and others, Cairo: Dār al-Ma'ārif, 1998-1999.
- Adler, Elkan Nathan (ed.), *Jewish Travelers: A Treasury of Travelogues from 9 Centuries*, New York: Hermon Press, 1966 (2nd edition).
- Al-Ahwāzī, 'Alī b. al-'Abbās (d. 384 H/994 CE), *al-Kiḥālah (ṭibb al-'uyūn), fī Kitāb Kāmil al-ṣinā'ah al-ṭibbīyah al-ma'rūf bi-al-Malakī*, eds. Muḥammad Zāfir al-Wafā'i and Muḥammad Rawās Qal'ah-jī, Damascus: Silsilat al-Turāth al-Ṭibbī ('Ilm al-Kiḥālah-10), 1997.
- Anonymous, *al-Jawād al-'arabī fī al-furūsīyah wa-tarbiyat al-khayl wa-bayṭaratuhā*, ed. Muḥammad al-Tūnajī, Kuwait: Manshūrāt Markaz al-Makḥṭūṭāt wa-al-Turāth wa-al-Wathā'iq, 1993.
- Al-Anṭākī, Dāwūd b. 'Umar, *Tadhkirat ulī al- albāb wa-al-jāmi' li-al-'ajab al-'ujāb*, Beirut: al-Maktabah al-Thaqāfiyah, n. d.
- Aristoteles (Semitico-Latinus), *The Arabic version of Aristotle, Parts of Animals (book XI-s' XIV of the Kitāb al-Ḥayawān)*, ed. and trans. Remke Kruk, Amsterdam: North Holland Pub. Co., 1978.
- Aristotle, *Generation of animals: The Arabic translation commonly ascribed to Yahya ibn al-Bitriq*, eds. by J. Brugman and H.J. Drossaart Lulofs, Leiden: E.J. Brill, 1971.
- Aristāṭalis, *Il Kitāb Aristāṭalis al-faylasūf fī l-firāsa nella traduzione di Ḥunayn b. Ishāq*, Antonella Gheretti (ed.), *Quaderni di Studi Arabi*. Studi e testi, 4, Università Ca' Foscari di Venezia, Rome: Herder Editrice, 1999.
- Al-'Aṭṭār al-Hārūnī, Abū al-Munā Dāwūd b. Abī al-Naṣr, known as Cohen al-'Aṭṭār (d. 658/1259), *Minḥāj al-dukkān wa-dustūr al-a'yān fī a'māl wa-tarākīb al-adwīyah al-nāfi'ah li-al-abdān*, ed. Ḥasan 'Aṣī, Beirut: Dār al-Manāhil, 1992.
- Al-Bakhshī, Muḥammad al-Ḥalabī, *Rashaḥāt al-midād fī-mā yata'allaq bi-al-ṣāfināt al-jyād*, ed. Muḥammad Rāghib al-Ṭabbākh, Aleppo: al-Maṭba'ah al-'Ilmiyah, 1394/1930.
- Al-Baladī, 'Abd al-Raḥmān b. Muḥammad, *Kitāb al-Kāfī fī al-bayzarah*, eds. Iḥsān 'Abbās and 'Abd al-Ḥafīz Maṣṣūr, Beirut: al-Mu'assasah al-'Arabīyah li-al-Dirāsāt wa-al-Naṣh, 1983.
- Bassano, Luigi, *Costumi et modi particolari della vita de'Turchi*, Munich: Max Hueber, 1963 [facsimile edition with intro. by Franz Babinger of the original published in Rome in 1545].
- Al-Bayṭār, Abū Bakr, *Kāmil al-ṣinā'atayn fī al-bayṭarah wa-al-zardaqaḥ al-ma'rūf bi-al-Naṣirī*, ed. 'Abd al-Raḥmān Ibrīq, Aleppo: Ma'had al-Turāth al-'Ilmī al-'Arabī, 1413/1993.
- Al-Bayṭār, Abū Bakr b. Badr al-Dīn, *Kāshif hamm al-wayl fī ma'rifat amrāḍ al-khayl, aw kāmīl al-ṣinā'atayn al-bayṭarah wa-al-zardaqaḥ al-ma'rūf bi-al-Naṣirī*, ed. 'Abd al-Raḥmān al-Daqqāq, Ishrāf Gérard Troupeau, Beirut: Dār al-Nafā'is, 1991-1996.
- Al-Bāzyār, Muḥammad ibn 'Abd Allāh ibn 'Umar, *Libro de los Animales que cazan (Kitāb al-Yawāriḥ)*, ed. J.M. Fradejas Rueda, Madrid: Editorial Casariego, 1987.
- Al-Bāzyār, Muḥammad ibn 'Abd Allāh, *Das Falken- und Hundebuch des Kalifen al-Mutawakkil. Ein arabischer Traktat aus dem 9. Jahrhundert*, Anna Akasoy and Stefan Georges (eds. & trans.), Wissenskultur und gesellschaftlicher Wandel, 11; Berlin: Akademie Verlag, 2005.
- Bertinoro, Obadiah, *From Italy to Jerusalem, The Letters of Rabbi Obadiah of Bertinoro from the Land of Israel*, eds. Menachem Emanuele Artom and Abraham David, Ramat Gan: C.G. Foundation Jerusalem Project, Department of Land of Israel Studies, Bar-Ilan University, 1997.

- Bertinoro, Obadiah of, "Zwei Briefe Obadjah's aus Bartenuro aus dem Jahre 5248 und 5249," ed. Adolf Reubauer, *Jahrbuch für die Geschichte der Juden u. des Judentums*, vol. III (1863), pp. 193-270.
- Bidāyat al-mujtahid*, "Le livre de la chasse (Averroès), extrait de la *Bidāyat al-mujtahid*," Texte et traduction annotée par François Viré," *Revue Tunisienne de Droit*, vol. II (1954), pp. 231-251.
- Al-Birūnī, Abū'l-Rayhān, *Kitāb al-Saydana fī'l-tibb* [sic.], ed. 'Abbās Zaryāb, Tehran: Iran University Press, 1991.
- Al-Buthārī, al-Maḡdisī, *Aḥsan al-taqāsīm fī ma'rifat al-aqālīm*, ed. Muḥammad Makhzūm, Beirut: Dār Iḥyā' al-Turāth, 1987.
- Al-Dā'ūdī, Shams al-Dīn Muḥammad b. 'Alī b. Aḥmad (d. 945H), *Ṭabaqāt al-Mufasssīrīn*, ed. 'Alī Muḥammad 'Umar, Cairo: Maktabat Wahbah, 1392/1972.
- Al-Dhahabī, Muḥammad b. Aḥmad, *al-Ṭibb al-nabawī*, ed. Aḥmad Rif'at al-Badrāwī, Beirut: Dār Iḥyā' al-'Ulūm, 1990.
- Al-Dhahabī, Muḥammad b. Aḥmad, *Kitāb al-'Ibar fī akhbar man ghabar*, ed. Ṣalāḥ al-Dīn al-Munjid, Kuwait: Dā'irat al-Maṭbū'āt lil-Nashr, 1960-1966.
- Al-Dhahabī, Shams al-Dīn Muḥammad b. Aḥmad b. 'Uthmān, *Sīyar a'lām al-nubalā'*, eds. Shu'ayb al-Arnā'ūt, Bashār 'Awwād Ma'rūf and others, Beirut: Mu'assasat al-Risālah, 1989 (6th ed.), 25 vols.
- Al-Dhubyānī, Ziyād b. M'āwīyah b. Qabāb, known as al-Nābighah al-Dhubyānī, *Diwān al-Nābighah al-Dhubyānī*, ed. Karam al-Bustānī, Beirut: Dār Ṣādīr, 1963.
- Al-Dim'yāṭī, Sharaf al-Dīn 'Abd al-Mu'min al-Miṣrī (d. 705/1305), *Faḍl al-khayl*, ed. Muḥammad Rāghib al-Ṭabbākh, Aleppo: al-Maṭba'ah al-'Ilmiyah, 1930.
- Al-Ghassānī, al-Malik al-Ashraf 'Umar b. Yūsuf (d. 696/1296), *al-Mughnī fī al-bayṭarah*, ed. Ramziyah Muḥammad al-Aṭraqjī, Baghdad: Markaz Iḥyā' al-Turāth al-'Ilmī al-'Arabī, 1989.
- Al-Ghaṭrīf, b. Qudāma al-Ghassānī (Eighth century AD), *The Book on Birds of Prey- Kitāb Ḍawārī al-tayr*, Facsimile Editions, ed. Fuat Sezgin, Reproduced from *MS Aḥmad III No. 2099*, Topkapı Saray Library, Istanbul, Frankfurt am Main: Publications of the Institute for the History of Arabic-Islamic Science at the Johann Wolfgang Goethe University, Series C—Facsimile Editions, vol. XXV, 1986.
- Ghistele, Josse van, "Le Voyage en Orient de Josse van Ghistele," *Revue Générale*, vol. XXXVII (1883), pp. 723-764.
- Al-Gitrif Ibn Qudama al-Ghassani, *al-Gitrif ibn Qudama al-Ghassani, Die Beizvögel (Kitāb dawārī at-tayr)*, Ein arabisches Falknereibuch des 8. Jahrhunderts, Deutsche Übersetzung, Detlef Möller and François Viré (ed. & trans.), Hildesheim-Zurich-New York: Georg Olms Verlag, 1988.
- Al-Gitrif ibn Qudama al-Ghassani, *Traité des oiseaux de vol (VIIIe siècle)*, *Le plus ancien traité de fauconnerie arabe*, traduit, introduit et annoté par François Viré et Detlef Möller. Texte préparé pour l'édition par Baudouin Van den Abeele. Bibliotheca Cynegetica, 3, Nogent-le-Roi: J. Laget, 2002.
- Al-Ḥamawī, 'Alī b. 'Abd al-Karīm b. Ṭarakhān 'Alā' al-Dīn al-Kaḥāl, *al-Aḥkām al-nabawīyah fī al-ṣinā'ah al-ṭibīyah*, ed. Aḥmad 'Abd al-Ghanī Muḥammad al-Najūlī, Beirut: Dār Ibn Ḥazm, 2003.
- Harff, Arnold von, *The Pilgrimage of Arnold von Harff knight from Cologne, through Italy, Syria, Egypt, etc.*, ed. and trans. Malcolm Letts, F.S.A., London: The Hakluyt Society, 1946.
- Al-Ḥashshā', Aḥmad (attributed to), *al-Manṣūrī fī al-bayzarah*, ed. 'Abd al-Ḥafīz Manṣūr, published at *"Majallat al-Mashriq"*, vol. II (Mars-April, 1968, year 62). Re-published as *al-Manṣūrī fī al-bayzarah*, Tunis, 1989.

- Ibn Abī al-Fadā'il, Mufaddal, *al-Nahj al-sadīd wa-al-durr al-farīd fīmā ba'da tārīkh ibn al-Amīd*, ed. Samira Kortantamer, Freiburg im Breisgau: K. Schwarz, 1973.
- Ibn Abī Uṣaybī'ah, *Uyūn al-anbā' fī ṭabaqāt al-aṭibbā'*, Beirut: Maktabat al-Ḥayāh, n.d.
- Ibn al-'Adīm, Kamāl al-Dīn 'Umar b. Aḥmad b. Abī Jarādah, *Bughyat al-ṭalab fī tā'rīkh Ḥalab*, ed. Suhayl Zakār, Damascus: Dār al-Ba'th, 1408/1988.
- Ibn al-'Awwām, Ebn el Awam [sic], Aben Mohamed Ben Ahmed Abu Zacaria Iahia Sevilliano, *Libro de Agricultura su autor El doctor excelente Abu Zacaria Iahia Aben Mohamed Ben Ahmed Ebn el Awam, Sevillano*, Madrid: La Imprenta Real, 1802 [reprinted in Madrid: Ministerio de Agricultura, Pesca y Alimentacion, 1988].
- Ibn al-'Awwām, *Le Livre de l'agriculture, Kitāb al-Filāha*, traduction de l'arabe de J.-J. Clément-Mullet, revue et corrigée, introduction de Mohammed El Faïz, Paris: Sindbad, 2000.
- Ibn al-Bayṭār, Ḍiyā' al-Dīn Abī Muḥammad 'Abd Allāh b. Aḥmad al-Andalusī al-Mālīqī (575-646 H/1197-1248), *al-Jāmi' li-mufradāt al-adwiyah wa-al-aghdhīyah*, Beirut: Dār al-Kutub al-'Ilmīyah, 1992.
- Ibn al-Faqīh, Abū 'Abd Allāh Aḥmad b. Muḥammad b. Ishāq al-Hamadhānī, *Kitāb al-Buldān*, ed. Yūsuf al-Hādī, Beirut: 'Ālam al-Kutub, 1996.
- Ibn al-Ḥāj, Abū 'Abd Allāh Muḥammad b. Muḥammad al-'Abdarī al-Fāsī (d. 737/1336), *al-Madkhal ilā al-shar' al-sharīf*, Beirut: Dār al-Kitāb al-'Arabī, 1972.
- Ibn al-Ḥusayn al-Bāzyār, Abū 'Abd Allāh al-Ḥasan (attributed to), Bāzyār al-'Azīz billāh al-Fāṭimī, *al-Bayzarah*, ed. Maḥmūd Kurd 'Alī, Damascus: Maṭbū'āt Majma' al-Lughah al-'Arabīyah, 1409/1988.
- Ibn al-'Imād, 'Abd al-Ḥayy b. Aḥmad, *Shadharāt al-dhahab fī akhbār man dhahab*, Beirut: al-Maktab al-Tijārī, 1966.
- Ibn al-Jawzī, Abū al-Faraj 'Abd al-Raḥmān b. 'Alī b. Muḥammad (d. 597/1201), *al-Muntaẓam fī tā'rīkh al-mulūk wa-al-umam*, eds. Muḥammad 'Abd al-Qādir 'Aṭā and others, Beirut: Dār al-Kutub al-'Ilmīyah, 1992.
- Ibn al-Marzubān, *Tafḍīl al-kilāb 'alā kathīr mimman labisa al-thīyāb*, ed. 'Iṣām Muḥammad Shbārū, Beirut: Dār al-Taḍāmūn, 1992.
- Ibn al-Nafīs, *Kitāb Sharḥ tashrīḥ al-qānūn*, ed. Salmān Qaṭāya, Cairo: al-Hay'ah al-Miṣriyah al-'Āmmah li-al-Kitāb, 1988.
- Ibn al-Tilmidh, *The Dispensatory of Ibn al-Tilmidh: Arabic text, English translation, study and Glossaries*, Oliver Kahle (tr. & ed.), Leiden-Boston: Brill, 2007.
- Ibn al-Ṭīqṭaqā, Muḥammad b. 'ālī b. Ṭabāṭibā, *al-Fakhrī fī al-ādāb al-sultānīyah*, Beirut: Dār Ṣādir 1996.
- Ibn al-Ukhūwah, Ḍiyā' al-Dīn Muḥammad b. Muḥammad b. Aḥmad al-Qurashī al-Shāfi'i, *Ma'ālim al-qurba fī aḥkām al-ḥisba* [sic], ed. R. Levey, Cambridge: Cambridge University Press, 1938.
- [Ibn Aybak al-Dawādārī, Abū Bakr b. 'Abd Allāh], *Die Chronik des Ibn Ad-Dawādārī, neuter Teil: Der Bericht über den Sultan Al-Malik An-Nāṣir Muḥammad Ibn Qala'un*, ed. Hans Robert Roemer, Cairo: Sami Al-Khandjī, 1960 [=Kanz al-durar wa-jāmi' al-ghurar, al-juz' al-tāsi' wa-huwa al-durr al-fākhīr fī sirat al-Malik al-Nāṣir].
- Ibn Bassām al-Muḥtasib, *Nihāyat al-rutbah fī ṭalab al-ḥisbah*, ed. Ḥusām al-Dīn al-Samarā'i, Baghdad: Maṭba'at al-Ma'ārif, 1968.
- Ibn Baṭṭūṭah, Muḥammad b. 'Abd Allāh al-lawātī, *Riḥlat Ibn Baṭṭūṭah al—musammā tuḥfat al-nuẓẓār fī gharā'ib al-amṣār wa-'ajā'ib al-asfār*, ed. Muḥammad 'Abd al-Mun'im al-'Aryān, Beirut: Dār Ḥiyā' al-'Ulūm, 1987.
- Ibn Duqmāq, Ibrāhīm b. Muḥammad Aydamar al-'Alā'i, *al-Jawhar al-thamīn fī siyar al-khulafā' wa-al-mulūk wa-al-salāṭīn*, ed. Sa'īd 'Abd al-Fatāḥ 'Ashūr, Riyadh: Jāmi'at Um al-Qurā and Markaz al-Baḥth al-'Ilmī, 1982.
- Ibn Duqmāq, Ibrāhīm b. Muḥammad Aydamar al-'Alā'i, *Kitāb al-Intiṣār li-wāsiṭat 'uqūd al-amṣār*, Cairo: al-Maṭba'ah al-Kubrā al-Amīriyah bi-Bulāq, 1309/1893.

- Ibn Ḥanbal, Aḥmad b. Muḥammad Abū 'Abd Allāh, *Musnad al-imām Aḥmad b. Ḥanbal wa-bi-hāmishihī muntakhab kanz al-'ummāl fī sunan al-aqwāl wa-al-af'āl*, Beirut: al-Maktab al-Islāmī li-al-Ṭibā'a wa-al-Nashr and Dār Ṣādir, 1969.
- Ibn Hode'il [Ibn Hudhayl al-Andalusī], *La Parure des cavaliers et l'insigne des preux, texte arabe d'Ibn Hode'il, Traduction et notes*, ed. Louis Mercier, Paris: Geuthner, 2 vols., 1922-1924.
- Ibn Hudhayl al-Andalusī, *Hilyat al-fursān wa-shi'ar al-shuj'ān*, Beirut: Dār al-Intishār, 1997.
- Ibn Ishāq, Abū Zayd Hunayn al-'Abbādī, *Kitāb Gālinūs fī fraq al-ṭibb li-al-muta'allimūn*, ed. Muḥammad Salīm Sālim, Cairo: Dār al-Kutub, 1978.
- Ibn Ishaq, Hunayn, *The Book of the Ten Treatises on the Eye Ascribed to Hunain ibn Ishaq (809-977 AD). The Earliest Existing Systematic Textbook on Ophthalmology*, trans. and ed. by Max Meyerhof, Cairo: Government Press, 1928.
- Ibn Iyās, *Journal D'un Bourgeois du Caire (Histoire des Mamlouks Circassiens)*, Traduit et annoté par Gaston Wiet, vol. I, Paris: A. Colin, 1955; vol. II, Paris, SEVPEN, 1960.
- Ibn Iyās, Muḥammad b. Aḥmad al-Ḥanafī, *Badā'i' al-zuhūr fī waqā'i' al-duhūr*, Cairo: Dār Ihyā' al-Kutub al-'Arabīyah, n. d.
- Ibn Jazzī, 'Abd Allāh b. Muḥammad al-Gharnāṭī, *Kitāb al-Khayl: maṭla' al-yumn wa-al-iqbāl fī intiqā' kitāb al-ihtifāl*, ed. Muḥammad al-Khaṭābī, Beirut: Dār al-Gharb al-Islāmī, 1985.
- Ibn Juljul, Abū Dā'ūd Sulaymān b. Ḥassān al-Andalusī, *Ṭabaqāt al-aṭibā' wa'l-ḥukamā'*, ed. Fu'ād al-Sayyid, Cairo: al-Ma'had al-'Ilmī al-Faransī li'l-Āthār al-Sharqīyah, 1955.
- Ibn Kathīr, al-Ḥāfiẓ al-Dimashqī Abū al-Fidā', *al-Bidāyah wa-al-nihāyah*, Beirut-Riyadh: Maktabat al-Ma'ārif, 1966.
- Ibn Khaldūn, 'Abd al-Raḥman b. Muḥammad, *Muqaddimat Ibn Khaldūn—al-Juz' al-awwal min kitāb al-ibar wa-dwān al-mubtada' wa-al-kabar fī ayām al-'arab wa-al-'ajam wa-al-barbar waman 'āsharahum min dhawī al-suṭān al-akbar*, Beirut: Dār al-Fikr, n. d.
- Ibn Khaldūn, 'Abd al-Raḥman b. Muḥammad, *Shifā' al-sā'il wa-tahdhib al-musā'il*, ed. Muḥammad Muṭī' al-Ḥāfiẓ, Damascus: Dār al-Fikr, 1996.
- Ibn Khallikān, Shams al-Dīn Abū al-'Abbās Aḥmad b. Muḥammad b. Abī Bakr, *Wafayāt al-a'yān wa-anbā' abnā' al-zamān*, ed. Iḥsān 'Abbās, Beirut: Dār Ṣādir, 1969-1970.
- Ibn Manglī, *De la chasse. Commerce des grands de ce monde avec les bêtes sauvages des déserts sans onde*, ed. & trans. by François Viré, Paris: Sindbad, 1984.
- Ibn Mankalī, Muḥammad, *Uns al-malā b-waḥsh al-falā'*, ed. Muḥammad 'Isā Ṣāliḥīyah, Amman: Dār al-Bashīr, 1993.
- Ibn Manẓūr al-Ifriqī, "b-ṭ-r.," *Lisān al-'Arab*, Beirut: Dār Ṣādir, 1986, vol. IV, pp. 69-70.
- Ibn Māsawayh, Yūhannā (Jean Mésué), *Le Livre des axiomes médicaux ("aphorismi")*, D. Jacquart and G. Troupeau (eds.), Édition du texte arabe et des versions latines, avec traduction française et lexique, Genève: Droz; Paris: Champion, 1980.
- Ibn Munqidh, Mu'ayyad al-Dawlah Abū Muẓaffar Usāmah Ibn Murshid al-Kinānī al-Shayzarī (d. 584/1188), *Kitāb al-I'tibār* (Usāmah's Memoirs), ed. Philip Hitti, Princeton: Princeton University Press, 1930.
- Ibn Qayyim al-Jawziyyah, Shams al-Dīn Muḥammad b. Abī Bakr b. Ayyūb al-Zar'ī al-Dimashqī (d. 751/1350), *al-Ṭibb al-nabawī*, ed. 'Abd al-Ghanī 'Abd al-Khalīq, Cairo: Dār al-Fikr, 1983.
- Ibn Rushd, *Rasā'il ibn Rushd al-ṭibīyah*, ed. Jorj Shihāta Qanawī wa-Sa'id Zāyid, Cairo: Markaz Taḥqīq al-Turāth, 1987.
- Ibn Shiḥnah, 'Afīf al-Dīn Ḥusayn b. Muḥammad, *al-Badr al-zāhir fī naṣrat al-Malik al-Nāṣir Muḥammad b. Qāyṭbāy (901-904/1495-1499)*, ed. 'Umar 'Abd al-Salām Tadmurī, Beirut: Dār al-Kitāb al-'Arabī, 1983.
- Ibn Sīnā, Abū 'Alī b. Abd Allāh b. al-Ḥusayn (370-428/980-1037), *al-Urjūzah fī al-ṭibb (dimn kitāb: min mu'allafāt Ibn Sīnā al-ṭibīyah)*, ed. Muḥammad Zuhayr al-Bābā: Aleppo: Manshūrāt Jāmi'at Ḥalab and Ma'had al-Turāth al-'Ilmī al-'Arabī wa-Ma'had al-Makhtūṭāt al-Ṭibīyah, 1404/1984.

- Ibn Sinā, *al-Qānūn fī al-ṭibb*, ed. Edwār al-Qush, Beirut: Mu'assasat 'Izz al-Dīn lil-Ṭibā'ah wa-al-Nashr, 1993.
- Ibn Sina, *Avicenna's Tract on Cardiac Drugs and Essays on Arab Cardiotherapy*, ed. by Hakeem Abdul Hameed. Karachi, Pakistan: Hamdard Foundation Press, 1983.
- Ibn Sina, *The General Principles of Avicenna's Canon of Medicine*, trans. by Mazhar H. Shah, Karachi, Pakistan: Naveed Clinic, 1966.
- Ibn Taghrī Bardī, Jamāl al-Dīn Abū al-Maḥāsin, *al-Manhal al-ṣāfi wa-al-mustawfī ba'da al-wafī*, ed. Muḥammad Amin, an introduction by Sa'id 'Abd al-Fattāh 'Āshūr, Cairo: Markaz Taḥqīq al-Turāth, 1993.
- Ibn Taghrī Birdī, Jamāl al-Dīn Abī al-Maḥāsin Yūsuf al-Atābikī, *al-Nujūm al-zāhirah fī mulūk Miṣr wa-al-Qāhirah*, ed. Muḥammad Ḥusayn Shams al-Dīn, Beirut: Dār al-Kutub al-'Ilmiyah, 1992 (16 vols.).
- Ibn Taymiyya, Aḥmad 'Abd al-Ḥalīm al-Ḥurāzī Abū al-'Abbās, *Sharḥ al-'umdah*, ed. Sa'ūd Ṣāliḥ al-'Uṭayshān, al-Riadh: Maktabat al-'Ubikān, 1413.
- Ibn Zāhirah, *al-Faḍā'il al-bāhirah fī maḥāsin Miṣr wa-al-Qāhirah*, ed. Muṣṭafā al-Saqqā wa-Kāmil al-Muhanddis, Cairo: Dār al-Kutub, 1969.
- Ikhwān al-Ṣafā, *Rasā'il Ikhwān al-ṣafā wa-khillān al-wafā*, ed. 'Arif Tāmir, Beirut-Paris: Manshūrāt 'Uwaydāt, 1995.
- Islamic Medical Wisdom: The Tibb al-A'imma*, trans. by Batoool Ispahany, trans. and ed. by Andrew J. Newman, London: The Muhammadi Trust, 1991.
- Al-Jāhīz, 'Amrū b. Baḥr, *Kitāb al-Ḥayawān*, ed. Fawzī 'Aṭawī, Beirut: Dār Ṣa'b, 1982 (7 vols. in 2 books).
- Al-Jāhīz, 'Amrū b. Baḥr, *Kitāb al-Qawl fī al-bighāl*, ed. Charl Pellat, Beirut: Dār al-Jil, 1995.
- Al-Jazari, Muḥammad b. Ibrāhīm, *La chronique de Damas d'al-Jazari, années 689-698 H.*, ed. J. Saovaget, Paris: Librairie ancienne H. Champion, 1949.
- Kanz al-fawā'id fī tanwī' al-mawā'id*, Manuela Marín and David Waines (eds.), Stuttgart-Beirut: Franz Steiner, 1993.
- Al-Karakī, Amin al-Dawlah abū al-Faraj Ibn al-Quff, *Jāmi' al-gharaḍ fī ḥifẓ al-ṣiḥḥah wa-daf' al-maraḍ*, ed. S. Hamarneh, Amman: Manshūrāt al-Jāmi'ah al-Urdunīyah, 1989.
- Khalīfah, Muṣṭafā b. 'Abd Allā Ḥājī (d. 1657), *Kitāb kashf al-zunūn 'an asāmi al-kutub wa-al-funūn*, eds. Muḥammad Sharaf al-Dīn Bālnaqāyā wa-Rif'at Bīlkah al-Kalīsī, Istanbul: Wakālat al-Ma'arif, 1941 [Tehran, 1974].
- Al-Khazrajī, 'Alī b. al-Ḥasan al-Zubaydī (812/1409), *Kitāb al-Uqūd al-lu'lu'īyah fī tā'rikh al-dawlah al-rasūliyah*, ed. Muḥammad Basyūnī 'Asal, Cairo: Dār al-Hilāl, 1911-1914.
- Kushājīm, Abū al-Fath Maḥmūd Ibn al-Ḥasan al-Kātib (d. after 358/968), *al-Maṣā'id wa-al-maṭārid*, ed. Muḥammad As'ad Ṭalas, Baghdad: Dār al-Ma'rifah, 1954.
- Leone Africano [Lioni Africano], "Descrizione dell'Africa di Giovan Lioni Africano," in Giovanni Battista Ramusio, *Navigazioni e viaggi*, ed. Marica Milanese, vol. I, Torino: Einaudi, 1978, pp. 9-460.
- Le traité de l'art de volerie (Kitāb al-bayzara), rédigé vers 385/955 par le Grand-Fouconnier du calife fatimide al-'Aziz bi-llah*, ed. & trans. by François Viré, Leiden: Brill, 1967 (originally published in *Arabica*, vol. XII (1966), pp. 1-296 and vol. XIII (1966), pp. 39-84).
- Maimonides [Moshe Ben Maimon], *Medical works vol. V: Lexicography of drugs & Medical response*, ed. Suessman Muntner, Jerusalem: Mossad Harav Kook, 1969.
- Al-Mansur's Book on Hunting*, eds. and trans. Sir Terence Clark and Muawiya Derhalli, Warminster, England: Aris & Philips Ltd, 2001.
- Al-Maqarri, Abu al-'Abbās Aḥmad b. Muḥammad al-Tilmisānī, *Nafḥ al-ṭib min ghuṣn al-Andalus al-raṭīb*, ed. Iḥsān 'Abbās, Beirut, 1381/1967.
- Al-Maqriẓī, Aḥmad b. 'Alī Taqī al-Dīn, *al-Dhahab al-masbūk fī dhikr man ḥajj min al-khulafā' wa al-mulūk*, ed. Jamāl al-Dīn al-Shayyāl, Cairo: Maktabat al-Khānījī, 1955.
- Al-Maqriẓī, Taqī al-Dīn Aḥmad b. 'Alī b. 'Abd al-Qādir b. Muḥammad (845/1441), *al-Mawā'iz wa-al-i'tibār bi-dhikr al-khiṭaṭ wa-al-āthār al-ma'rūf bi-al-khiṭaṭ al-maqriẓīyah*, 4 vols. In 2 books, Cairo: Maktabat al-Ādāb, 1996.

- Al-Mas'ūdī, 'Alī b. al-Ḥusayn (d. 346/957), *Murūj al-dhahab wa-ma'ādin al-jawhar*, ed. Muḥammad Muḥyī al-Dīn 'Abd al-Ḥamīd, 4 vols., Beirut: Dār al-Fikr, 1393/1973.
- Moamin et Ghatrif, *Traité de fauconnerie et des chiens de chasse, Edition Princesps de la Version Franco-Italienne*, par Håkan Tjerneld, Stockholm-Paris: Editions C.E. Fritze and Librairie J. Thiébaud, 1945.
- Al-Mubārḳfurī, Abū 'Alī Muḥammad 'Abd al-Raḥmān b. 'Abd al-Raḥīm, *Tuḥfat al-Aḥwadhī bi-sharḥ jāmi' al-Tirmidhī*, ed. 'Abd al-Raḥmān Muḥammad 'Uthmān, al-Madīnah al-Munawwarah: al-Maktabah al-Salafīyah, 1964-1967.
- Mufaddal, Ibn Abī'l Fada'il [Mufaḍḍal, Ibn Abī al-Faḍā'il], *Histoire des sultans mamluks: Moufazzal ibn Abil-Fazail*, texte arabe publié et traduit en français par E. Blochet, Paris: Firmin-Didot, 1916-1927.
- Al-Na'imī, 'Abd al-Qādir b. Muḥammad al-Dimashqī (927/1520-1), *al-Dāris fī tā'rīkh al-madāris*, ed. Ja'far al-Ḥusnī, Cairo: Maktabat al-Thaqāfah al-Dīniyah, 1988.
- Al-Nāshirī, Ḥamzah b. 'Abd Allāh b. Muḥammad al-Zubaydī (833-926/1430-1520), *Kitāb Intihāz al-furaṣ fī al-ṣayd wa-al-qanṣ*, ed. 'Abd Allāh Ḥusayn al-Sāda, Damascus: Dār Kinān, 2000.
- Al-Nawawī, Abū Zakariyā Yahyā b. Sharaf (d. 676/1277), *Sharḥ al-Nawawī 'alā Ṣaḥīḥ Muslim*, Beirut: Dār Iḥyā' al-Turāth, 1392 H.
- Perron, Nicolas, *Le Nâcerî. La perfection des deux arts, ou Traité complet d'hippologie et d'hippiatrie arabes*, Traduit de l'Arabe d'Abou Bekr ibn Bedr, Deuxième partie, seconde édition, Hippatrie (III), Paris: Vve Bouchard-Huzard, 1852-1860.
- Piloti, Emmanuel (b. ca. 1371), L'Égypte au commencement du quinzième siècle d'après le traité d'Emmanuel Piloti de Crète, incipit 1420, avec une introduction et notes par P.H. Dopp, Cairo: Université Fouad I, 1950.
- Al-Qazwīnī, Zakariyā b. Muḥammad b. Maḥmūd (682/1283), *'Ajā'ib al-makhlūqāt wa-gharā'ib al-mawjūdāt*, Beirut: Dār al-Sharq al-'Arabī, n. d.
- Al-Quṭṭī, 'Alī b. Yūsuf Abī al-Ḥasan (d. 1248 CE), *Kitāb Ikḥbār al-'ulamā' bi-akḥbār al-ḥukamā'*, Cairo: Maktabat al-Mutanabbī, n.d.
- Al-Qur'ān al-karīm wa-bi-hāmishihī tafsīr al-imāmayn al-jalīlayn al-'allāmah Jalāl al-Dīn Muḥammad b. Aḥmad wa-Jalāl al-Dīn 'Abd al-Raḥmān al-Suyūṭī, Damascus: al-Maktabah al-Hashimīyah, 1985.
- Al-Qur'ān, A Contemporary Translation by Ahmed Ali, Princeton: Princeton University Press, 1993.
- Al-Rasūlī, Al-Malik al-Mujāhid 'Alī b. Dā'ūd b. Yūsuf (d. 764/1362), *al-Aqwāl al-kāfiyah wa-al-fuṣūl al-shāfiyah fī al-khayl*, ed. Yahyā Jabūrī, Beirut: Dār al-Gharb al-Islāmī, 1987.
- Al-Ṣafadī, Ṣalāḥ al-Dīn Khalīl b. Aybak (764/1362), *al-Wāfi bil-wafayāt*, ed. Rīter, Damascus: al-Hashimīyah, 1959.
- Al-Ṣāḥīb Taj al-Dīn, Abū 'Abd Allāh Muḥammad Ibn Muḥammad Ibn 'Alī (d. 707/1307), *Kitāb al-Baytarah, Book on Veterinary Medicine*, reproduced from MSS 3608, 3609, Fatih Collection, Sülemaniye Library, Istanbul, ed. Fuat Sezgin, Frankfurt am Main: Institute for the History of Arabic-Islamic Science at the Johann Wolfgang Goethe University, Series C—Facsimile Editions, vols. V/1-2, 1984.
- Al-Sakhāwī, Shams al-Dīn Muḥammad b. 'Abd al-Raḥmān, *al-Ḍaw' al-lāmi' li-aḥl al-qarn al-tāsī'*, ['an naskhat Dār al-Kutub al-Miṣriyah al-muqābilah bi-naskhat al-Khizānah al-Zāhiriyah fī Dimashq wa-al-naskhah al-Aṣfiyah fī al-Hind], Cairo: Maktabat al-Qudsi, 1354 H.
- Al-Shayzarī, 'Abd al-Raḥmān b. Naṣr, *The Book of the Islamic Market Inspector: Nihāyat al-Rutba fī Ṭalab al-Ḥisba (The Utmost Authority in the Pursuit of Ḥisba)*, R.P. Buckley (trans.), London: Oxford University Press on behalf of the University of Manchester, 1999.
- Al-Suyūṭī, 'Abd al-Raḥmān b. Abī Bakr Jalāl al-Dīn, *al-Raḥmah fī al-ṭibb wa-al-ḥikmah*, Beirut: Dār al-Rā'id al-'Arabī, 1983.

- Al-Suyūṭī, Jalāl al-Dīn ‘Abd Allāh b. Abī Bakr (1445-1505), *al-Dībāj ‘alā ṣaḥīḥ Muslim ibn al-Ḥajāj*, ed. Abū Ishāq al-Ḥuwaynī al-Atharī, al-Khabar (Saudi Arabia): Dār Ibn ‘Affān, 1996.
- Tafur, Pero, *Travels and Adventures (1435-1439)*, ed. & tr. Malcolm Letts, New York and London: Harper and Brothers, 1926.
- Al-Ṭarābulṣī, al-Ḥusāmī, *al-Furūsiyah bi-rasm al-Jihād wamā a‘adda Allāh li-al-mujāhidīn min al-‘ibād*, ed. ‘Arif Aḥmad ‘Abd al-Ghanī, Damascus: Dār Kanān, 1995.
- Al-Ṭayyib, Abū Muḥammad ‘Abd Allāh b. ‘Abd Allāh b. Aḥmad Abī Maḥzamah (1465-1540), *Tā’rikh thaghr ‘Adan ma’ nukhabh min tawārikh ibn al-Mujāwir wa-al-Jundī wa-al-Ahdal*, ed: Oscar Löfgren, Leiden: Brill, 1963.
- Al-‘Umarī, Shihāb al-Dīn Aḥmad b. Yahyā, b. Faḍl-Allāh, *al-Ta’rīf bi al-muṣṭalah al-sharīf*, ed. Muḥammad Ḥusayn Shams al-Dīn, Beirut: Dār al-Kutub al-‘Ilmiyah, 1988.
- Al-Zāhiri, Ghars al-Dīn Khalīl Ibn Shāhīn (872/1476), *Kitāb Zubdat kashf al-mamālik wa-bayān al-ṭuruq wa-al-masālik*, ed. Būlus Rāwis, Paris: al-Maṭba‘ah al-Jumhūriyah, 1894.
- Al-Zahrāwī, Khalaf b. al-‘Abbās abū al-Qāsim (d. 1031 CE), *al-Maqālah al-thalāthūn fī al-‘amal bi-al-yad min al-kay wa-al-shaqq wa-al-baṭṭ min kitāb: al-Taṣrīf liman ‘ajiza ‘an al-ta’līf*, facsimile edition of a manuscript, published with Russian translation by Dya’ al-Dīn b. Mūsā Bunyātuv, Moscow: Dār al-‘Ilm, 1983.
- Al-Zahrāwī, *Albucasis on Surgery and Instruments. a Definitive Edition of the Arabic Text with English Translation and Commentary*, trans. and eds. by M. S. Spink and G. L. Lewis; and Arabic, *Journal of the Asiatic Society of Bengal*, vol. VI/ 7 (1910), p. 315-380.
- Al-Zamakhsharī, Muḥammad b. ‘Umar, *Rabī‘ al-abrār wa-nuṣūṣ al-akhbār*, ed. Salīm al-Na‘īmī, Baghdad: Maṭba‘at al-Na‘īmī, 1980.
- Al-Zubaydī, Muḥibb al-Dīn Abī Fayḍ al-Sayyid Muḥammad Murtaḍā, “b-ṭ-r.” *Taj al-‘arūs min jawāhir al-qāmūs*, ed. ‘Alī Shīrī, Beirut: Dār al-Fikr, 1994, vol. I, pp. 97-99.

C. STUDIES

- Abbott, Nabia, *Studies in Arabic Literary Papyri*, I- Historical Texts, The University of Chicago Oriental Institute publications, vols 76-77, Chicago: University of Chicago Press, 1957.
- ‘Abd al-Ḥamīd, Sa’d Zaghlūl, *al-‘Imārah wa-al-funūn fī dawlat al-Islām*, Alexandria: Mansha’at al-Ma‘ārif, 1968.
- ‘Abd al-Jawwād, Tawfīq Aḥmad, *Tā’rikh al-‘imārah wa-al-funūn al-islāmīyah*, Cairo: al-Maṭba‘ah al-Faniyah al-Ḥadīthah, 1969.
- ‘Abd al-Rāziq, Aḥmad, *Wasā’il al-tasliyah ‘ind al-muslimīn*, Nadwat al-tā’rikh al-Islāmī wa-al-wasīṭ: Dirāsāt fī al-ḥaḍārah al-islāmīyah bi-munāsabat al-qarn al-khāmis ‘ashr al-hijrī, Cairo: Dār al-Ma‘ārif, 1985.
- Abd ar-Raziq, Ahmad, “Le chasse au faucon d’après des céramiques du Musée du Caire,” *Annales Islamologiques*, vol. IX (1970), pp. 109-125.
- Abd Ar-raziq, Ahmad, “Le vizirat et les vizirs d’Égypt au temps des Mamluks,” *Annales Islamologiques*, vol. XVI (1980), pp. 83-239.
- Abou El-Fadl, Khalid, “Dogs in Islam,” *Encyclopedia of Religion and Nature*, ed. Born Taylor, New York: Continuum, 2005, pp. 498-500.
- Abū Yahyā, Aḥmad, *al-Khayl fī qaṣā’id al-jāhilīyyīn wa-al-islāmīyyīn*, ed. Yāsīn al-Ayyūbī, Sidon-Beirut: al-Maktabah al-‘Aṣrīyah, 1997.
- Abu-Rabia, Aref, “Veterinary and Medicinal Plants among Bedouin Tribes,” *Herbs, Humans and Animals/ Erbe, uomini e bestie*, A. Pieroni, ed., Köln: Experiences Verlag, 1999, pp. 1-13.

- Adams, J.N., *Pelagonius and Latin Veterinary Terminology in the Roman Empire*, Leiden, New York, Köln: E.J. Brill, 1995.
- Aḥmad 'Aṭiyat-Allāh, *al-Qāmūs al-islāmī: mawsū'ah li-al-ta'rīf bi-muṣṭalahāt al-fikr al-islāmī wa-ma'ālim al-ḥaḍārāh al-islāmīyah wa-tā'rīkh al-duwal al-islāmīyah wa-tarājīm al-'ulamā'*, Cairo: Maktab al-Nahḍah al-Miṣriyah, 1966-1970.
- Aḥmad, Rafeeqe, *Islam and Vegetarianism*, Bristol: VIVA, n.d.
- Aḥmad, 'Ādil al-Sayyid, *al-Islām wa-al-ṭib al-bayṭarī*, Cairo: s. n., 1986.
- Akasoy, Anna, "The Influence of Arabic Tradition of Falconry and Hunting on Western Europe," *Islamic Crosspollinations: Interactions in the Medieval Middle East*, eds.: Anna Akasoy, James E. Montgomery and Peter E. Pormann, Exter: Gibb Memorial Trust, 2007, pp. 46-64.
- Allsen, Thomas T., *The Royal Hunt in Eurasian History*, Philadelphia: University of Pennsylvania Press, 2006.
- Arbel, Benjamin, "The Attitude of Muslims to Animals: Renaissance Perceptions and Beyond," *Animals and People in the Ottoman Empire*, ed. Suraya Faroqhi, Istanbul: Eren, 2010, pp. 57-74.
- Arbel, Benjamin, "The Last Decades of Venice's Trade with the Mamluks: Importations into Egypt and Syria," *Mamluk Studies Review*, vol. VIII/ 2 (2004), pp. 37-86.
- Arbel, Benjamin, "Venetian Cyprus and the Muslim levant, 1473-1570" in N. Coureas and J. Riley Smith (eds.), *Cyprus and the Crusades* (Nicosia, 1995), pp. 159-185 [reprinted in: *Cyprus, The Franks and Venice, 13th-16th Centurie*, art. XII. London: Ashgate, 2000].
- Arberry, A.J., *Sufism: An Account of the Mystics of Islam*, London: George Allen & Unwin, 1950.
- Ashtor, Eliyahu, "Levantine Weights and Standard Parcels: A Contribution to the Metrology of the Later Middle Ages," *Bulletin of the School of Oriental and African Studies*, 45 (1982), pp. 471-488.
- Ashtor, Eliyahu, *Levant Trad in the Later Middle Ages*, Princeton-New Jersey: Princeton University Press, 1983.
- Atil, Esin, *Art of the Arab World*, Washington, D.C.: Freer Gallery of Art, 1975.
- Atil, Esin, *Renaissance of Islam: Art of the Mamluks*, Washington, D.C.: Smithsonian institution press, 1981.
- Atil, Esin, W.T. Chase & Paul Jett, *Islamic Metalwork in the Freer Gallery of Art*, Washington, D.C.: Freer Gallery of Art, Smithsonian Institution, 1985.
- Ayalon, David, "Notes of the *Furusīyya* Exercises and Games in the Mamluk Sultanate," *Scripta Hierosolymiana IX, Studies in Islamic History and Civilization*, ed. Uriel Heyd, Jerusalem: Magnes press and the Hebrew University, 1961, pp. 31-62.
- Ayalon, David, "Studies on the Structure of the Mamluk Army," *Bulletin of the School of Oriental and African Studies*, vol. XV (1953), pp. 448-458.
- Ayalon, David, "The Plague and its Effects upon the Mamluk Army," *Journal of the Royal Asiatic Society*, 1946, pp. 67-73.
- Ayalon, David, "The Wafidiya in the Mamluk Kingdom," *Islamic Culture*, vol. XXV (1951), Jubilee Number, pp. 89-104.
- Ayalon, David, *Gunpowder and Firearms in the Mamluk Sultanate: A Challenge to a Medieval Muslim Military Society*, Jerusalem: Magnes Press, Hebrew University of Jerusalem, 1994.
- 'Āshūr, Sa'id, "Fann al-qitāl al-baḥrī 'ind al-muslimīn fī ḍaw' kitābāt Muḥammad Ibn Mankalī," *Majallat kullīyat al-ādāb wa-al-tarbiyah*, XII (July 1977/Jamādī al-Ākhirah 1397 H), pp. 35-46.
- 'Āshūr, Sa'id, *al-Mujtama' al-miṣrī fī 'aṣr salāṭin al-mamālīk*, Cairo: Dār al-Nahḍah al-'Arabiyah, 1962.
- 'Abd al-Ḥamīd, Sa'd Zaghlūl, *al-'Imārah wa-al-funūn fī dawlat al-Islām*, Alexandria: Mansha'at al-Ma'ārif bi-al-Iskandariyah, 1986.

- ‘Abd al-Jawwad, Tawfiq Aḥmad, *Tārīkh al-‘Imārah wa-al-funūn al-Islāmīyah*, Cairo: al-Maṭba‘ah al-Faniyah al-Ḥadīthah, 1969.
- ‘Akkāwī, Riḥāb Khadr, *al-Muwjaẓ fī tārīkh al-ṭibb ‘ind al-‘Arab*, Beirut: Dār al-Manāhil, 1995.
- Barkai, Ron, *Science, Magic and Mythology in the Middle Ages*, Jerusalem: The Van Leer Jerusalem Institute, 1987 [Hebrew].
- Bashear, Suliman, “Riding Beasts on Divine Missions: an Examination of the Ass and Camel Traditions,” *Journal of Semitic Studies*, vol. XXXVII (Spring, 1991), pp. 37-75.
- Beaujouan, Guy (ed.), *Médecine humaine et vétérinaire à la fin du Moyen Âge*, Centre de recherches d’Histoire et de Philologie de la IVe Section de l’École Pratique des Hautes Études, Genève–Paris: Librairie Droz et Librairie Minard, 1966.
- Beck, Corinne, *Le Faucon favori des Princes*, Paris: Gallimard, 1990.
- Behrens-Abouseif, Doris, “The Image of the Physician in Arab Biographies of the Post-Classical Age,” *Der Islam*, vol. LXVI (1989), pp. 331-343.
- Behrens-Abouseif, Doris, *Fath Allāh and Abu Zakariyya: Physicians under the Mamluks*, Cairo: Institut Français d’Archéologie Orientale, 1987.
- Behrens-Abouseif, Doris, *Islamic Architecture in Cairo: An Introduction*, Leiden: E.J. Brill, 1992.
- Behrens-Abouseif, Doris, “A Late Mamluk (?) Basin with Zodiac Imagery,” *Annales Islamologiques*, vol. XXIX (1995), pp. 111-131.
- Bekman, Muzaffer, *Veteriner Tarihi*, Ankara: Ankara Basim ve Cildevi, 1940.
- Berkey, Jonathan P., *The Formation of Islam: Religion and Society in the Near East 600-1800*, Cambridge: Cambridge University press, 2003.
- Berkey, Jonathan, “The Muhtasib of Cairo under the Mamluks: Toward an Understanding of an Islamic Institution,” *The Mamluks in Egyptian and Syrian politics and society*, Michael Winter and Amalia Levanoni (eds.), Leiden—Boston: Brill, 2004, pp. 245-276.
- Berkey, Jonathan Porter, *The Transmission of Knowledge in Medieval Cairo: a Social History of Islamic Education*, Princeton: Princeton University Press, 1992.
- Birnbaum, Eleazar, “The Mysterios incantation to cure sick horses: A formula in a Mamluke-Kipchak treatise,” *Journal of Turkish studies: Türklik Bilgisi Arastirmalari*, vol. XXI (1997), pp. 96-101.
- Björck, Gudmund, “Griechische Pferdeheilkunde in arabischer Überlieferung,” *Le Monde Oriental, Revue des Etudes Orientales* (Upsala), vol. XXX (1936), pp. 1-12.
- Bodorligeti, A., “The Medical Terminology in the *Kitab baytarat al-vazih*, a Fourteenth Century Mamluk-Kipchak Treatise on Veterinary Medicine,” *Istanbul Üniversitesi Edebiyat Fakültesi Türk dili ve edebiyati dergisi*, vol. XXI (1973), pp. 115-125.
- Bodson, Lilianne (ed.), *Les animaux exotiques dans les relations internationales: espèces, fonctions, significations*, Liège: Université de Liège, 1998.
- Brandenburg, Dietrich, *Islamic Miniature Painting in Medical Manuscripts*, Basle: Editiones ‘Roche’, 1982.
- Bray, Julia (ed.), *Writing and Representation in Medieval Islam*, New York: Routledge, 2006.
- Brend, Barbara, *Islamic Art*, Cambridge, Mass: Harvard University Press, 1991.
- Bresc, Henri, “Les Entrées Royales des Mamlûks—Essai d’approche comparative,” *Genèse de L’État Moderne en Méditerranée*, Collection de L’École Française de Rome, vol. CLXVIII (1993), pp. 81-96.
- Bressou, Clément, *Histoire de la médecine vétérinaire*, Paris: Presses universitaires de France, 1970.
- Brockelmann, Carl, *Geschichte der Arabischen Litteratur*, Leiden: E.J. Brill, 1937-1949.
- Browne, Edward Granville, *Arabian Medicine: Being the Fitzpatrick Lectures Delivered at the College of Physicians in November 1919 and November 1920*, Cambridge: Cambridge University Press, 1921.
- Buhl Fr. [J. Jomier], “Maḥmal,” *Encyclopaedia of Islam, New Edition*, vol. VI (1991), pp. 44-46.
- Bulliet, Richard W. *The Camel and the Wheel*. New York: Columbia University Press, 1990.

- Burnett, Charles and Danielle Jacquart (eds.), *Constantine the African and 'Ali ibn al-'Abbas al-Magusi: The 'Pantegni' and Related Works* (Studies in Ancient Medicine, 10), Leiden: E.J. Brill, 1994.
- Cahen, Claude; M. Talbi; R. Mantran; A.K.S. Lambton; A.S. Bazmee Ansari, "Hisba," *Encyclopaedia of Islam, New Edition*, vol. III (1971), pp. 485-493.
- Cahen, Claude, *L'Islam des origines au début de l'Empire Ottoman*, Frankfurt am Main: Bordas, 1970.
- Carrara, Angelo Alves, "Geoponica and Nabatean Agriculture: A New Approach into their Sources and Authorship," *Arabic Sciences and Philosophy*, vol. XVI (2006) pp. 103-132, 2006.
- Carrubba, R.W. and J.X. Bowers, "The Western World's First Detailed Treatise on Acupuncture: Willem Ten Rhijne's *De Acupunctura*," *Journal of the History of Medicine and Allied Sciences*, 29, October 1974, pp. 371-398.
- Chapoutot-Remadi, Mounira, "Symbolisme et formalisme de l'élite mamlûke: la cérémonie de l'accession à l'émirat," *Genèse de L'État moderne en Méditerranée*, Collection de l'École Française de Rome, No. CLXVIII (1993), pp. 61-79.
- Chevaux et cavaliers arabes dans les arts d'Orient et d'Occident*, Exposition présentée à l'Institut du Monde Arabe, Paris: du 26 novembre 2002 au mars 2003), Paris: Éditions Gallimard, 2002.
- Chiha, Habib K., *La province de Bagdad: son passé, son présent, son avenir: contenant aussi des notes sur le chemin de fer de Bagdad et une étude inédite sur les tribus nomades de la Mésopotamie*, Cairo: Imprimerie el-Maaref, 1908.
- Chipman, Leigh, *The World of Pharmacy and Pharmacists in Mamlûk Cairo*, Sir Henry Wellcome Asian Series, vol. 8, Leiden & Boston: Brill, 2010.
- Claus, C.J.M., "Camel Diseases and the Traditional Methods of Treatment in Use among the Ghrib Camel Breeders of the Northwestern Tunisian Sahara," *Al-Ma' thurat al-Sha'biyyah*, Doha-Qatar, vol. XXXIV (1994), pp. 7-25.
- Conrad, Lawrence J., "The Social Structure of Medicine in Medieval Islam," *Bulletin of the Society for the Social History of Medicine*, vol. XXXVII (1985), pp. 11-15.
- Creswell, K.A.C., *The Muslim Architecture of Egypt*, 2 vols., New York: Hacker Art Books, 1978.
- Creswell, K.A.C., *A Short Account of Early Muslim Architecture*, revised and supplemented by James W. Allan, Cairo: The American University in Cairo Press, 1989.
- Creswell, K.A.C., *Early Muslim Architecture*, New York: Hacker Art Books, 1979.
- Cron, Patricia, *Slaves on Horses: The Evolution of the Islamic Polity*, Cambridge: Cambridge University Press, 1980.
- Daniel, N., *The Arabs and Medieval Europe*, London: Longman, 1975.
- Darrag, Ahmad, *L'Égypte sous les Règne de Barsbay 825-841/1422-1438*, Damas: Institut Français de Damas, 1961.
- Diderot & D'Alembert, *L'Encyclopédie: Recueil de planches, sur les sciences, les Arts libéraux, et les Arts mécaniques, avec leur explication—Art du Cheval*, Paris: Bibliothèque de l'Image, 2002.
- Djebbar, Ahmed, *Une histoire de la science arabe*, Paris: Éditions du Seuil, 2001.
- Dols, Michael W. and Adil S. Gamal, *Medieval Islamic Medicine: Ibn Ridwan's Treatise on the Prevention of Bodily Ills in Egypt*, Berkeley: University of California Press, 1984.
- Dols, Michael W., "The Origins of the Islamic Hospital: Myth and Reality," *Bulletin of the History of Medicine*, vol. LXII (1987), pp. 367-390.
- Dols, Michael W., *Majnun: The Madman in Medieval Islamic Society*, ed. by Diana E. Immisch, Oxford: The Clarendon Press, 1992.
- Dols, Michael W., *The Black Death in the Middle East*, Princeton: Princeton University Press, 1977.

- Dols, Michael W., *Medieval Islamic Medicine: Ibn Ridwan's Treatise: "On the Prevention of Bodily Ills in Egypt,"* Arabic text ed. Adil S. Gamal, London: University of California Press, 1984.
- Dopp, P.H., "Le Caire vu par les voyageurs occidentaux du Moyen Age," *Bulletin de Société de Géographie d'Égypte*, vol. XXIII (1949), pp. 117-149.
- Doyen-Higuet, M., "The Hippocratic and Byzantine Veterinary Medicine," *Dumbarton Oaks Papers*, vol. XXXVIII (1984), pp. 111-113.
- Driesch, Angela von den and Joris Peters, *Geschichte der Tiermedizin, 5000 Jahre Tierheilkunde*, Stuttgart and New York: Schattauer, 2003.
- Du Ry, Carl J., *Art of Islam*, New York: Harry N. Abrams, 1970.
- Dunlop, Robert H. & David J., William, *Veterinary Medicine: An Illustrated History*, St. Louis: Mosby, 1995.
- Eddé, Anne-Marie, "Les médecins dans la société syrienne du VIIe/XIIIe siècle," *Annales Islamologiques*, Tome XXIX (1995), Institut Français d'Archéologie Orientale du Caire, pp. 91-109.
- Edelstein, Ludwig, *Ancient Medicine: Selected Papers of Edelstein*, eds. Owsei Temkin and C. Lilian Temkin, Baltimore and London: Johns Hopkins University Press, 1967.
- Eisenstein, Herbert, "Chronologie der Jagd-Emire unter den Mamluken-Sultanen," *Wiener Zeitschrift für die Kunde des Morgenlandes*, vol. LXXXII (1992), pp. 121-128.
- Eisenstein, Herbert, "Der *amūr šikār* unter den Mamlukensultanen," *XXV Deutscher Orientalistentag. Vorträge, München, 8-13 April 1991*, ed. by Cornelia Wunsch (*Zeitschrift der deutschen morgenländischen Gesellschaft*, Supplement 10), Stuttgart: Franz Steiner Verlag, 1994, pp. 129-135.
- Eisenstein, Herbert, "Las obras árabes de medicina veterinaria: ¿tratados médicos o literatura edificante?," *Actas XVI Congreso UEA*, ed. by Concepción Vázquez de Benito and Migue Ángel Manzano Rodríguez, Salamanca: Agencia Española de Cooperación Internacional, Consejo Superior de Investigaciones Científicas, Union Européenne d'Arabisants et d'Islamisants, 1995, pp. 157-163.
- Eisenstein, Herbert, "Review of *Das Pyramidenbuch des Abu Ga'far al-Idrisi* (st. 649/1251), edited by Ulrich Haarmann," *Wiener Zeitschrift für die Kunde des Morgenlandes*, vol. LXXXIV (1994), pp. 233-234.
- Eisenstein, Herbert, "Review of *Die Beschreibung Indiens in der 'Rihla' des Ibn Battuta*, by Stephan Conermann," *Wiener Zeitschrift für die Kunde des Morgenlandes*, vol. LXXXVII (1997), pp. 317-318.
- Eisenstein, Herbert, "Review of *Die Chronik des Ibn ad-Dawadari, Fünfter Teil*, edited by Dorothea Krawulsky," *Wiener Zeitschrift für die Kunde des Morgenlandes*, vol. LXXXIV (1994), p. 237.
- Eisenstein, Herbert, "Review of *Islamic Cosmology: A Study of as-Suyuti's al-Hay'a al-Saniya fi al-Hay'a al-Sunniya*, by Anton B. Heinen," *Wiener Zeitschrift für die Kunde des Morgenlandes*, vol. LXXVIII (1988), pp. 256-258.
- Eisenstein, Herbert, "Review of *Les trois vies du sultan Baibars: Choix des textes et présentation*, edited by Jacqueline Sublet," *Wiener Zeitschrift für die Kunde des Morgenlandes*, vol. LXXXIV (1994), pp. 244-245.
- Eisenstein, Herbert, "Review of *The Office of Qādī al-Qudāt in Cairo under the Bahrī Mamlūks*, by Joseph H. Escovitz," *Wiener Zeitschrift für die Kunde des Morgenlandes*, vol. LXXVIII (1988), pp. 259-260.
- Eisenstein, Herbert, "Review of *Weltgeschichte und Weltbeschreibung im Mittelalterlichen Islam*, by Bernd Radtke," *Wiener Zeitschrift für die Kunde des Morgenlandes*, vol. LXXXIV (1994), pp. 239-241.
- Eisenstein, Herbert, "Überlegungen zu einer Darstellung der Rolle des Pferdes in der arabisch-islamischen Kulturgeschichte," *Wiener Zeitschrift für die Kunde des Morgenlandes*, vol. LXXXVI (1996), pp. 107-117.

- Eisenstein, Herbert, *Einführung in die arabische Zoographie: Das tierkundliche Wissen in der arabisch-islamischen Literatur*, Berlin: Dietrich Reimer Verlag, 1990.
- Elgood, Cyril, *A Medical History of Persia and the Eastern Caliphate from the Earliest Times to the Year AD 1932*, London: Cambridge University Press, 1951; reprinted, with additions and corrections by G. van Heusden, Amsterdam: APA-Philo Press, 1979.
- Elgood, Cyril, *A Medical History of Persian and the Eastern Caliphate*, Amsterdam: APA – Philo Press, 1979 (1951).
- Elgood, Cyril, *Safavid Medical Practise, or The Practise of Medicine, Surgery, and Gynaecology in Persia between 1500 AD and 1750 AD*, London: Luzac & Co., 1970.
- Epstein, H., *The Origin of the Domestic Animals of Africa*, 2 vols., New York, London, Munich, 1971.
- Erk, N., "Abu Bekr and Arabic Veterinary Medicine in the 14th Century," *MSU veterinarian*, vol. XX/3 (1960), pp. 114-118.
- Erk, N., "Studies on Veterinary Manuscripts in Turkey and Three Samples from the 9th, 12th and 14th Centuries," *Ferruh Dinçer, Veterinary Medicine, History Approaches*, Ankara: F. Dinçer, 2002, pp. 159-174.
- Esposito, John L. (ed.), *The Oxford History of Islam*, Oxford: Oxford University Press, 1999.
- Estes, J. Worth and LaVerne Kuhnke, "French Observations of Disease and Drug Use in Late Eighteenth-Century Cairo," *Journal of the History of Medicine and Allied Sciences*, vol. XXXIX (1984), pp. 121-152.
- Ettinghausen, Richard, *Arab Painting*, New York: Skira-Rizzoli International Publications, 1977.
- Fahd, T. "Firāsa," *Encyclopaedia of Islam, New Edition*, vol. II (1965), pp. 916-917.
- Fahd, T., "Ibn Wahshiyya," *Encyclopaedia of Islam, New Edition*, vol. III (1971), pp. 963-965.
- Farès, Bishr, *Livre de la Thèriaque: Manuscrit Arabe à Peintures de la fin du XII^e siècle conservé à la Bibliothèque Nationale de Paris*, Art Islamique, Tome II, Cairo: Imprimerie de l'Institut Français d'Archéologie Orientale, 1953.
- Feingold, Aaron J., *Three Jewish Physicians of the Renaissance: The Marriage of Science and Ethic*, New York: American Friends of Beth Hatefutsoth, 1996.
- Fernandes, Leonor, "Mamluk Politics and Education: The Evidence from two Fourteenth Century Waqfiyya," *Annales Islamologiques*, vol. XXIII (1987), pp. 87-98.
- Ferré, André (Padre), "La condizione dei cristiani in Egitto ed in Siria nell'età dei Mamelucchi Bahrî secondo le fonti arabe," *Quaderni islamo-Cristiani*, Luglio 1996 (Atti a cura del CADR-Centro Ambrosiano di Documentazione per le Religioni, Milano, il 20-21, Novembre 1992, pp. 3-32).
- Ferruh Dinçer, "Evaluation of Veterinary Medicine with the Historical Context of the Turks," In Nil Sari, ed., *History of Medicine, Pharmacology, Veterinary Medicine in Anatolia and Turkic Cultures* (38th International Congress on History of Medicine), Istanbul, 2002, pp. 83-110.
- Fischer, Klaus-Dietrich, "Ancient Veterinary Medicine: A Survey of Greek and Latin Sources and some Recent Scholarship," *Medizinhistorisches Journal*, XXIII (1988), pp. 191-209.
- Fischer, Klaus-Dietrich, "A Horse! A Horse! My Kingdom for a Horse!': Versions of Greek Medicine in Medieval Italy," *Medizin Historisches Journal*, vol. XXXIV (1999), pp. 123-138.
- Fischer, Klaus-Dietrich (ed.), *Pelagonii: Ars Veterinaria*, Leipzig: Teubne, 1980.
- Foltz, Richard C., *Animals in Islamic Tradition and Muslim Culture*, Oxford: Oneworld, 2006.
- Froehner, Reinhard, "Das Nacerische Buch des Abu Bekr ibn Bedr, Beitrag zur Kenntnis der mittelalterlichen orientalischen Veterinärmedizin," *Archiv für wissenschaftliche und praktische Tierheilkunde*, vol. LX (1929), pp. 362-375.
- Froehner, Reinhard, "Zur persischen Hippologie und Hippieatrie des 11. Jahrhunderts," *Veterinärhistorisches Jahrbuch*, vol. VI (1929), pp. 33-97.
- Froehne, Reinhard, "Arabische Kamelheilkunde des Mittelalters," *Archiv für wissenschaftlich und praktische Tierheilkunde*, vol. CXVII (1934), pp. 358-361.

- Froehner, Reinhard, *Die Tierheilkunde des Abu Bekr ibn Bedr*, Leipzig: Verlag Walter Richter (Abhandlungen aus der Geschichte der Veterinärmedizin, vol. XXIII), 1931 [=Veterinärhistorisches Jahrbuch, vol. VI (1931), Leipzig, pp. 1-150].
- Froehner, Reinhard, "Die Tierkrankheiten bei Avicenna (10. Jh.), *De animalibus libri XIX*," *Veterinärhistorische Mitteilungen*, Herausgegeben von der Gesellschaft für Geschichte u. Literatur der Veterinärmedizin, Nr. VII, 17. Jahrgang (1937), pp. 49-52.
- Gaulin, Jean-Louis, "Giordano Ruffo et l'art vétérinaire," *Micrologus*, vol. II (1994), pp. 185-198.
- Georges, Stefan, *Das Zweite Falkenbuch Kaiser Friedrichs II. Quellen, Entstehung, Überlieferung und Rezeption des Moamin*, Berlin: Akademie Verlag, 2008.
- Gibb, Hamilton and Harlod Bowen, *Islamic Society and the West, a Study of the Impact of Western Civilization on Moslem Culture in the Near East*, London: Oxford University Press, 1950-1957.
- Goitein, S.D., *A Mediterranean Society: The Jewish Communities of the Arab World as Portrayed in the Documents of the Cairo Geniza*, Berkeley: University of California Press, 1999, vol. II (The Community).
- Grube, Ernst J., "The Hippiatrica Arabica Illustrata: Three 13th-Century Manuscripts and Related Material," in *A Survey of Persian Art*, eds. by A.U. Pope and P. Ackermann [Proceedings, the IVth International Congress of Iranian Art and Archaeology, Part A, vol. XIV] (Oxford: University Press, 1967), pp. 3188-55 and Plates 1523-5.
- Haarmann, Ulrich, "Miṣr: 5, The Mamlūk Period 1250-1517," *Encyclopaedia of Islam, New Edition*, vol. VII (1993), pp. 165-177.
- Haarmann, Ulrich, *Quellenstudien zur Frühen Mamlukenzeit*, Islamkundliche Untersuchungen, Band 1, Freiburg im Breisgau: Klaus Schwarz Verlag, 1970.
- Haas, Kenneth B., "Animal Therapy Over the Ages," *Veterinary Heritage*, vol. XXII, No. 19 (May, 1999), pp. 10-13.
- Hadad, Sami I., *History of Arab Medicine*, Beirut: Oriental Hospital, 1975.
- Hadzibajiric, Fejzullah, "Bajtarnames: orijentalne veterinarske knjigi. (Summary: Bajtarnames—oriental veterinary books.);" *Anli Ghazi Husrevbegove Biblioteke*, VII-VIII (1982), p. 77-88 [Incl. list of 7 MSS in Sarajevo.-Bosnia].
- Hamarneh, Sami Khalaf, *Health Sciences in Early Islam: Collected Papers*, ed. by Munawar A. Anees, 2 vols., Blanco, TX: Zahra Publications, 1983-4.
- Hamarneh, Sami Khalaf, *Origins of Pharmacy and Therapy in the Near East*, Tokyo: The Naito Foundation, 1973.
- Hameen-Anttila, Jaakko, *The Last Pagans of Iraq: Ibn Wahshiyya And His Nabatean Agriculture*, Islamic History and Civilization, Studies and Texts, vol. 3, Leiden, Boston: Brill, 2006.
- Hammer-Purgstall, Josef Freiherr von, *Das Kamel*, 2 vols., Denkschriften der Kaiserlichen Akademie der Wissenschaften, Philosophisch-Historische Classe, Wien, vol. VI/1 (1855), VII/1 (1856), Vienna, 1855-1856.
- Hammer-Purgstall, Josef Freiherr von, *Das Pferd bei den Arabern*, Vienna: Strauss & Cramer GmbH, 1855-1856 (reprinted in Hildesheim-New York: Olms Presse, 1981).
- Hanna, Nelly, *An Urban History of Bulāq in the Mamlūk and Ottoman Periods*, Cairo, 1983.
- Heemskerck, Margaretha T., *Suffering in the Mu'tazilite Theology: Abd al-Jabbar's Teaching on Pain and Divine justice*, Islamic Philosophy, Theology and Science, vol. XLI, Leiden: Brill, 2000.
- Heide, Martin, "Beschreibung und Behandlung einiger Erkrankungen, die die Extremitäten der Pferde betreffen aus dem *Kitāb al-furūsīya wa-l-bayṭara* des Muḥammad ibn Ya'qūb ibn aḥī Ḥizām al-Ḥuttulī," *Die Welt des Orients*, vol. XXXIV (2004), pp. 105-152.
- Heide, Martin, *Das Buch der Hippiatrie von Muḥammad ibn Ya'qūb ibn aḥī Ḥizām al-Ḥuttulī, Teil 1: Einleitung, Übersetzung, Indices*, Wiesbaden: Otto Harrassowitz, 2008.

- Heusinger, Carl Friedrich, *Theomnestus, Leibthierarzt Theoderichs des Grossen, Königs der Ostgothen. Ein Glückwunsch zur Jubelfeier des ... Ritters Dr. E.L. Wilhelm Nebel zu Giesen den 12 december 1843 dargebracht*, Cassel, 1843.
- Heyd, Wilhelm, *Histoire du commerce du Levant au Moyen-Age*, 2 vols., Amsterdam: Adolf M. Hakkert, 1967 [reprint of Leipzig, 1885-86].
- Hillenbrand, Robert, *Islamic Art and Architecture*, London: Thames and Hudson, 1999.
- Hinz, Walther, *Islamische Masse und Gewichte: umgerechnet ins metrische System*, Leiden: E.J. Brill, 1995.
- Hitti, Philip, *History of the Arabs: From the Earliest Time to the Present*, 10th ed., New York: St. Martin's Press, 1970.
- Hocine Benkheira, Mohammed, Catherine Mayeur-Jaouen and Jacqueline Sublet, *L'Animal en Islam*, Paris: Les Indes Savantes, 2005.
- Holt, P.M., "Al-Nāṣir Muḥammad b. Kalāwūn (684-741/1285-1341)," *Encyclopaedia of Islam, New Edition*, vol. VII (1993), pp. 991-993.
- Holt, P.M., *The Age of the Crusades: the Near East from the Eleventh Century to 1517*, London: Longman 1986.
- Hoope, Karl, "Mulomedicina," *Paulys Realencyclopädie der classischen Altertumswissenschaft*, vol. XXXI (1933), pp. 503-513.
- Hooper, David, "Medicinal Lizards," *Journal of the Asiatic Society of Bengal*, vol. IV, No. 6 (1910), pp. 301-303.
- Hoyland, Robert G., "Theomnestus of Niceopolis, Ḥunayn ibn Ishāq and the beginnings of Islamic veterinary science," *Islamic Reflections, Arabic Musings: Studies in Honour of Professor Alan Jones*, eds. Robert G. Hoyland and Philip F. Kennedy, Oxford: Gibb Memorial Trust, 2004, pp. 150-169.
- Huff, Toby E., *The Rise of Early Modern Science: Islam, China, and the West*, Cambridge: Cambridge University Press, 1993.
- Hyland, Ann, *The Horse in the Middle Ages*, Sutton Publishing, Phoenix Mill-Stroud, 1999.
- Al-Ḥabashī, 'Abd Allāh, *Maṣādir al-Fikr al-Islāmī fī al-Yaman*, Sidon: al-Maktabah al-'Aṣriyah, 1988.
- Iglesias Perez, J., Barrera Salas, M., "La albeitería y el caballo," *Al-Andalus y el caballo*, Barcelona & Madrid: Lunwerg Editores, 1995, pp. 149-158.
- Irwin, Robert, *Mamluks and Crusaders: Men of the Sword and Men of the Pen*, Farnham, Surrey; Burlington VT: Ashgate, Variorum, 2000.
- Irwin, Robert, *The Middle East in the Middle Ages: the Early Mamluk Sultanate, 1250-1380*, London: Croom Helm, 1986.
- Iskandar, A.Z., "A Doctor's Book on Zoology: al- Marwazi's *Taba'i al-Hayawan* (Nature of animals) re-assessed," *Oriens*, XXVII-XXVIII (1980-1981), pp. 266-312.
- ʿĪsā, Aḥmad Bik, *Tā'rikh al-bīmāristānāt fī al-Islām*, Beirut: Dār al-Rā'id al-'Arabī, 1981.
- Jadon, Samira, "The Physicians of Syria During the Reign of Salah al-Din 570-589 A.H./1174-1193 a.d.," *Journal of the History of Medicine and Allied Sciences*, vol. 25, 1970, pp. 323-340.
- Jean Sauvaget, *La Poste aux chevaux dans l'empire des Mamelouks*, Paris: Librairie d'Amérique et d'Orient Adrien-Maisonneuve, 1941.
- Ka'dān, 'Abd al-Nāṣir, *ʾIlāj al-kusūr 'ind al-aṭibbā' al-'arab*, Aleppo: Dār al-Qalam, 1990.
- Al-Karmili, Al-Ab Anastās, "al-Bayṭarah 'ind al-ʾArāb li-Ḥabib Afandī Shihā, *Majalat al-Mashriq*, Beirut, vol. XV (1898), pp. 684-686, and vol. XX (1989), pp. 943-946.
- Kennedy, Philip F. (ed.), *On Fiction and Adab in Medieval Arabic Literature*, Studies in Arabic language and literature vol. VI, Wiesbaden: Harrassowitz, 2005.
- Al-Khaṭṭābī, Muḥammad al-'Arabī, *al-Ṭibb wa-al-aṭibbā' fī al-Andalus al-Islāmīyah: dirāsah wa-tarājim wa-nuṣūṣ*, Beirut: Dār al-Gharb al-Islāmī, 1988.
- Alkhateeb Shehada, Housni, "Arab Veterinary Medicine and the 'Golden Rules' for Veterinarians, according to a Sixteenth-Century Medical Treatise," *Animals and People in the Ottoman Empire*, ed. Suraiya Faroqhi, Istanbul: Eren, 2010, pp. 315-331.

- Krenkow, F., "Das Kitab al-Hail des Abu—'Ubaida," *Islamica*, VII /1 (1935), pp.113-114.
- Kuhnke, LaVerne, *Lives at Risk: Public Health in Nineteenth-Century Egypt*, Berkeley: University of California Press, 1990.
- Labib, Subhi Y., *Handelsgeschichte Ägyptens Im Spätmittelalter (1171-1517)*, Franz Steiner Verlag GMBH, Wiesbaden, 1965.
- Lapidus, Ira M., *Muslim Cities in the Later Middle Ages*, Cambridge Mss.: Harvard University Press, 1967.
- Leclainche, E., *Histoire de la médecine vétérinaire*, Toulouse: Office du Livre, 1936.
- Leclerc, Lucien, *Histoire de la médecine arabe*, Paris: E. Leroux, 1876.
- Leder, Stefan (ed.), *Story-Telling in the Framework of Non-Fictional Arabic Literature*, Wiesbaden: Harrasowitz, 1998.
- Leighton, Albert C., "The Mule as a Cultural Invention," *Technology and Culture*, vol. VIII/1 (January, 1967), pp. 45-52.
- Leiser, Gary and Michael Dols, "Evliya Chelebi's Description of Medicine in Seventeenth-Century Egypt," *Sudhoffs Archiv*, vol. LXXI (1987), pp. 197-216; vol. LXXIII (1988), pp. 49-68.
- Leslie, Charles (ed.), *Asian Medical Systems: A Comparative Study*, Berkeley: University of California Press, 1976.
- Lev, Yaacov (ed.), *Towns and Material Culture in the Medieval East, The Medieval mediterranean: Peoples, Economies and Cultures, 400-1453*, vol. XXXIX, Leiden: Brill, 2002.
- Levanoni, Amalia, *A Turning Point in Mamluk History: The Third Reign of al-Nasir Muhammad Ibn Qalawun (1310-1341)*, Leiden: E.J. Brill, 1995.
- Levey, Martin, *Early Arabic Pharmacology: An Introduction Based on Ancient and Medieval Sources*, Leiden: E.J. Brill, 1973.
- Levey, Martin, "Fourteenth-Century Muslim Medicine and Hisba," *Medical History, The Wellcome Trust Centre for the History of Medicine at UCL*, vol. VII/2 (April, 1963), pp. 176-182.
- Levi, Martin & Safwat Suryal, "Usus al-Ṭibb fī al-Qarn al-Ḥādī 'Ashar min Kitāb al-I'tidāl lil-Nasawī," *Al-Mashriq*, vol. II (april, 1969, year 63), pp. 141-156.
- Lewin, B., "al- Dinawari," *Encyclopaedia of Islam, New Edition*, vol. II (1965), p. 300.
- Lindner, Kurt, *Beiträge zu Vogelfang und Falknerei im Altertum*, Berlin-New York: Walter de Gruyter, 1973.
- Little, Donald P., *An Introduction to Mamluk Historiography: an Analysis of Arabic and Bibliographical Sources for the Reign of al-Malik an-Nāṣir Muḥammad ibn Qalā'ūn*, Wiesbaden: F. Steiner, 1970.
- Mack-Fisher, Loren R., "From Ugarit to Gades: Mediterranean Veterinary Medicine," *Maarav*, vol. V-VI (Spring, 1990), pp. 207-220.
- Māḍī, Ibrāhīm, *Ziy umā' al-Mamālīk fī Miṣr wa-al-shām*, Cairo: al-Hay'ah al-Miṣriyya al-'āmāh li-al-kitāb, 2009.
- Mansouri, Mohamed Tahar, "Les Communautés Marchandes occidentales dans L' espace Mamlouk (XIIIe—XVe Siècle)," *Coloniser ou Moyen Age*, Michel Balard and Alain Ducellier (eds.), Paris: Armand Colin, 1995. pp. 89-111.
- Marín, Manuela, *Kanz al-Fawā'id fī tanwī' al-Mawā'id*, Beirut and Stuttgart: Franz Steiner Verlag, 1993.
- Masri, al-Hafiz Basheer Ahmad, *Animals Welfare in Islam*, Nairobi: The Islamic Foundation, 2007.
- Masri, al-Hafiz Basheer Ahmad, *Animals in Islam*, Petersfield: Athene Trust, 1989.
- Mayer, Leo A., *Mamluk Costume*, Geneva: A. Kundig, 1952.
- McCabe, Anne, *A Byzantine Encyclopaedia of Horse Medicine. The Sources, Compilation, and Transmission of the Hippitrica*, Oxford: Oxford University Press, 2007.
- McDonald, M.V., "Animal-book as a genre in arabic literature," *British Society for Middle Eastern Studies bulletin*, vol. XV/1 and 2 (1988), pp. 3-10.

- Mercier, Louis, *La chasse et les sports chez les Arabes*, Paris: Librairie des Sciences Politiques et Sociales, Marcel Rivière Éditeur, 1927.
- Meyerhof, Max, "On the Transmission of Greek and Indian Science to the Arabs," *Islamic Culture: Hyderabad Quarterly Review*, vol. IX (1937), pp. 17-29.
- Meyerhof, Max, *Studies in Medieval Arabic Medicine: Theory and Practise*, ed. by Penelope Johnstone, London: Variorum Reprints, 1984.
- Michell, A.R. (ed.), *The Advancement of Veterinary Science. History of the Healing Profession. Parallels between Veterinary and Medical History (The Bicentenary Symposium)*, vol. III, London, 1993.
- Mira, Toru, "Administrative Networks in the Mamluk Period: Taxation, Legal Execution and Bribery," *Islamic Urbanism in Human History: Political Power and Social Network*, ed. Sato Tsugitaka, London, New York: Kegan Paul International, 1997.
- Möller, Detlef, *Studien zur mittelalterlichen arabischen Falknereiliteratur*, Quellen und Studien zur Geschichte der Jagd X, Berlin: Walter de Gruyter & Co., 1965.
- Moulé, Leon, *Histoire de la médecine vétérinaire ... Deuxième période: Histoire de la médecine vétérinaire au Moyen Age (476 à 1500). Première partie: la médecine vétérinaire arabe*, Paris: Imprimerie Maulde, Doumenc et C^{ie}, 1896 [extrait du Bulletin de la Société Centrale de Médecine Vétérinaire].
- Moulé, Leon, *Histoire de la médecine vétérinaire... Troisième période: Histoire de la médecine vétérinaire dans les temps modernes. Premier fascicule. La médecine vétérinaire au seizième siècle*, Paris: Imprimerie Maulde, Doumenc et C^{ie}, 1911 [extrait du Bulletin de la Société Centrale de Médecine Vétérinaire].
- Moulé, Leon, *Histoire de la médecine vétérinaire ... Deuxième période: Histoire de la médecine vétérinaire au Moyen Age (476 à 1500). Deuxième partie: la médecine vétérinaire en Europe*, Paris: Imprimerie Maulde, Doumenc et C^{ie}, 1900 [extrait du Bulletin de la Société Centrale de Médecine Vétérinaire].
- Moulé, Leon, *Histoire de la médecine vétérinaire ... Première période: Histoire de la médecine vétérinaire dans l'Antiquité*, Paris: Imprimerie Maulde, Doumenc et C^{ie}, 1891 [extrait du Bulletin de la Société Centrale de Médecine Vétérinaire].
- Msaier, Abdul Raḥmān and Amna al-Bairaq, "Folk Medicine for Child and Mother Diseases," *al-Ma'thūrāt al-Sha'biyyah*, vol. XLII (April 1996), pp. 71-81.
- Mufaddal, "Histoire des sultans mamluks," *Paire d'Orient*, vol. XX/1 (Paris, 1920).
- Murphey, Rhoads, "Ottoman Medicine and Transculturalism from the Sixteenth Through the Eighteenth Century," *Bulletin of the History of Medicine*, vol. LXVI (1992), pp. 376-403.
- Nasr, Seyyed Hossein, *Science and Civilization in Islam*, Cambridge, Mass.: Harvard University Press, 1968.
- Niesters, Horst, "The Art of Falconry," *Game and Hunting*, ed. Kurt G. Blüchel, Köln: Köne-mann, 1997.
- Nāji, Hilāl, "Nuṣūṣ min al-mawrūth al-ḥarbī—al-khuyūl al-yamanīyah fī al-mamlakah al-rasūliyah," *Majallat al-Mawrid*, IV (1983), pp. 91-222.
- Oder, Eugen, "Apsyrtus. Lebensbild des bedeutendsten altgriechischen Veterinärs," *Veterinärhistorisches Jahrbuch*, vol. II (1926), pp. 121-136.
- Ofele, Felix, von., "The Assyrian Veterinary Physician," *Journal of the American Oriental Society*, vol. XXXVII (1917), pp. 331-332.
- Orev, Y. and A. Abu-Rabia, "Donkeys as Draught Animals," *The Professional Handbook of the Donkey, Compiled for the Donkey Sanctuary*, by Elisabeth D. Svendsen, M.B.E., Sidmouth, Devon (England), 1989 (2ed Ed.), pp. 259-264.
- Ouerfelli, Mohamed, *Le sucre. Production, commercialisation et usages dans la Méditerranée médiévale*, Leiden/Boston: Brill, 2008.
- Öztopçu, Kurtulus, "A Fourteenth-Century Mamluk Kipchak Treatise on Veterinary Sciences: *Kitab fi Riyazati l-Hayl*," *Journal of Turkish Studies*, vol. XVII (1993), pp. 153-170.

- Pérès, Henri, *La Poésie andalouse en arabe classique au XI^e siècle*, Paris: Publications de l'Institut d'Études Orientales, Faculté des Lettres d'Alger, 1953.
- Petry, Carl F., *Protectors or Praetorians? The Last Mamlūk Sultans and Egypt's Waning as Great Power*, Albany: State University of New York Press, 1994.
- Petry, Carl F., *The Civilian Elite of Cairo in the Later Middle Ages*, Princeton, N.J.: Princeton University Press, 1982.
- Philip F. Kennedy (ed.), *On Fiction and Adab in Medieval Arabic Literature*, Studies in Arabic language and literature vol. VI, Wiesbaden: Harrassowitz, 2005.
- Phillott, D.C. (Lieut.-Colonel) and R.F. Azoo, "On Hunting Dogs, Being an Extract from the *Kitab 'l-Jamharah fi 'ilm 'l-Bazyarah*," *Journal of the Asiatic Society of Bengal*, vol. III, No. 9 (1907), pp. 599-600.
- Phillott, D.C. (Lieut.-Colonel) and R.F. Azoo, "Some Birds and other Animals that Have Been Metamorphosed [being an Extract from the *Kitab 'l-Jamharah fi 'ilm 'l-Bazyarah*, an Arabic manuscript, No. 865, in the Library of Asiatic Society of Bengal]," *Journal of the Asiatic Society of Bengal*, vol. III, No. 2 (1907), pp. 139-143.
- Phillott, D.C. (Lieut.-Colonel) and R.F. Azoo, "The Birds' Complaint Before Solomon: Being an Extract with a Translation from the *Kitab 'l-Jamharah fi 'ilm 'l-Bazyarah*," *Journal of the Asiatic Society of Bengal*, vol. III, No. 3 (1907), pp. 173-178.
- Phillott, D.C. (Lieut.-Colonel) and R.F. Azoo, "Things Which the Owners of Hawks Should Avoid, Being an Extract from the *Kitab 'l-Jamharah fi 'ilm 'l-Bazyarah*," *Journal of the Asiatic Society of Bengal*, vol. III, No. 6 (1907), pp. 401-403.
- Phillott, D.C. (Lieut.-Colonel), "Indian Hawking-Gloves," *Journal of the Asiatic Society of Bengal*, vol. III, No. 9 (1907), pp. 603-605.
- Phillott, D.C. (Lieut.-Colonel), "Murgh-Nama: Extract on Cocking ("Murgh-Nama") from the "*Sayd-gah-i Shawkati*," an Urdu Work on Sport Written by Nawab Yar Muhammad Khan of the Rampur State, AD 1883, and two Appendices," *Journal of the Asiatic Society of Bengal*, Vol. VI, No. 2 (1910), pp. 73-91.
- Phillott, D.C. (Lieut.-Colonel), "Note on Common Merlin (*Aesalon regulus*)," *Journal of the Asiatic Society of Bengal*, vol. III, No. 9 (1907), pp. 601-602.
- Phillott, D.C. (Lieut.-Colonel), "Note on Indian Hawk-bells," *Journal of the Asiatic Society of Bengal*, vol. III, No. 9 (1907), note 60.
- Phillott, D.C. (Lieut.-Colonel), "Note on the Red-headed Merlin (*Aesalon chicquera*)," *Journal of the Asiatic Society of Bengal*, vol. III, No. 6 (1907), pp. 395-399.
- Phillott, D.C. (Lieut.-Colonel), "Note on the Saker or Cherrug Falcon (*Falco Cherrug*)," *Journal of the Asiatic Society of Bengal*, vol. III, No. 3 (1907), pp. 179-192 (Plates III and IV).
- Phillott, D.C. (Lieut.-Colonel), "Note on the Shahin Falcons (*Falco peregrinator* and *F. barbarus*, Blanford)," *Journal of the Asiatic Society of Bengal*, vol. III, No. 5 (1907), pp. 389-393.
- Phillott, D.C. (Lieut.-Colonel), "Vocabulary of Technical Falconary Terms in Urdu, Persian, and Arabic," *Journal of the Asiatic Society of Bengal*, vol. VI, No. 7 (July 1910), pp. 315-380.
- Plessner, Martin, "Baytār," *Encyclopaedia of Islam, New Edition*, vol. I (1960), p. 1149.
- Plessner, Martin, "The Natural Sciences and Medicine," *The Legacy of Islam*, second edition, eds. J. Schacht and C.E. Bosworth, Oxford: The Clarendon Press, 1974, pp. 425-460.
- Pormann, Peter E. and Emilie Savage-Smith, *Medieval Islamic Medicine*, Washington, D.C.: Georgetown University Press, 2007.
- Pouelle-Drieux, Yvonne, "L'Hippiatrie dans l'Occident latin: du XIII^e au XV^e siècle," *Médecine Humaine et vétérinaire à la fin du Moyen Âge*, Guy Beaujouan (ed.), Centre de Recherches d'Histoire et de Philologie de la IV^e Section de l'École pratique des Hautes Études, Genève—Paris, 1966, pp. 11-170.
- Qāsim, 'abduḥ Qāsim, *'Aṣr ṣalāṭin al-mamālīk: al-tārīkh al-siyāsī wa-al-ijtimā'ī*, Cairo: Ein for Human and Social Studies, 1998.

- Qāsim, 'Abduh Qāsim, *Dirāsāt fī tā'rīkh Miṣr al-ijtimā'i—'aṣr salāṭīn al-mamālīk*, Cairo: Dār al-Ma'ārif, 1983.
- Al-Qaysī, Nuri Ḥammūdī, *al-Furūsiyah fī al-shī'r al-jāhili*, Baghdad: Maktabat al-Nahḍah, 1964.
- Ragheb, Youssef, *Les messagers volants en terre d'Islam*, Paris: CNRS, 2002.
- Ragib, Yūsuf, "Actes de vente d'esclaves et d'animaux d'Égypte médiévale," Institut Français d'Archéologie Orientale, Cahier des *Annales islamologiques*, XXIII (2002), Le Caire, 2002.
- Rahman, Fazlur, *Health and Medicine in the Islamic Tradition: Change and Identity*, New York: Crossroad, 1987.
- Rashed, Roshdi (ed.), *Encyclopedia of the Arabic Science*, 3 vols., London: Taylor & Francis, Inc., 1996.
- Raymond, André, *Cairo*, Cambridge Mass. and London: Harvard University Press, 2000.
- Al-Razi (Rhazes), *A Treatise on the Smallpox and Measles by Abu Bacr Mohammed ibn Zacariya ar-Razi (Commonly called Rhazes)*, trans. by W.A. Greenhill. London: Sydenham Society, 1847.
- Richard, F., "Un traité persan d'hippiatrie portant la date de 555H. (=1160) dans un manuscrit de la Bibliothèque Nationale," *Studia Iranica*, vol. XIX (1990), pp. 95-101.
- Ritter, H., "La Parure des cavaliers und Literatur über die ritterlichen Künste," *Der Islam*, vol. XVIII (1928), pp. 116-154.
- Robson J., "Ḥadīth," *Encyclopaedia of Islam, New Edition*, vol. III (1971), pp. 23-29.
- Rosenthal, Franz, *The Herb. Hashish Versus Medieval Muslim Society*, Leiden: E.J. Brill, 1971.
- Rosenthal, Franz, *Science and Medicine in Islam: A Collection of Essays*, London: Variorum Reprints, 1990.
- Ruska, J. [D.R. Hill], "Mikṡās," *Encyclopaedia of Islam, New Edition*, vol. VII (1993), pp. 39-40.
- Ruska, J. [F. Viré], "Ibn Al-Mundhir," *Encyclopaedia of Islam, New Edition*, vol. III (1971), pp. 890-891.
- Sadek, M. M., *The Arabic Materia Medica of Dioscorides*, St. Jean-Christosome, Qubec: Les Editions du Sphinx, 1983.
- Shaki, Mansour, Ḥasan Tābakṡ and Ṣādeq Sajjād, "Dām Pezeṡkī [Veterinary medicine]," *Encyclopaedia Iranica*, vol. IV (1993), pp. 619-623.
- Said, H. M., *Traditional Greco-Arab and Modern Western Medicine: Conflict or Symbiosis*, Karachi, Pakistan: Hamdard Foundation, 1979.
- Sanagustin, Floréal, "Princes et Médecins dans l'Orient musulman classique," *Annales Islamologiques*, Tome XXXI (1997), pp. 169-180.
- Sauvaget, Jean, "Esquisse pour l'histoire de la ville de Damas," *Revue des Études Islamiques*, vol. VIII (1934), pp. 422-480.
- Sauvaget, Jean, *La chronique de Damas d'Al-Jazari (années 689-698)*, Paris: Bibliothèque e l'École des Hautes Études fasc 294, 1949.
- Sauvaget, Jean, *La Poste aux chevaux dans l'empire des Mamelouks*, Paris: Librairie d'Amérique et d'Orient, Adrien-Maisonneuve, 1941.
- Savage-Smith, Emilie, "Drug Therapy of Eye Diseases in Seventeenth-Century Islamic Medicine: The Influence of the 'New Chemistry' of the Paracelsians," *Pharmacy in History*, vol. XXIX (1987), pp. 3-28.
- Savage-Smith, Emilie, "Ibn al-Nafis's Perfected Book on Ophthalmology and His Treatment of Trachoma and Its Sequelae," *Journal for the History of Arabic Science*, vol. IV (1980), pp. 147-206.
- Savage-Smith, Emilie, "Islamic Science and Medicine," *Information Sources in the History of Science and Medicine*, ed. by P. Corsi and P. Weindling, London: Butterworth, 1983, pp. 436-455.
- Savage-Smith, Emilie, "John Channing: Eighteenth-Century Apothecary and Arabist," *Pharmacy in History*, vol. XXX (1988), pp. 63-80.

- Scarborough, John (ed.), *Symposium on Byzantine Medicine*, Washington D.C.: Dumbarton Oaks Research Library and Collection, Dumbarton Oaks Papers, vol. XXXVIII (1984).
- Schäfer, Barbara, *Beiträge zur mamlukischen Historiographie nach dem Tode al-Malik an-Nāṣir mit einer Teiledition der Chronik Šams ad-Dīn aš-Šuġā'īs*, Freiburg im Breisgau: Klaus Schwarz Verlag, 1971.
- Schönig, Hanne, "Reflections on the Use of Animal Drugs in Yemen," *Quaderni di Studi Arabi*, vols. XX-XXI (2002-2003), pp. 157-184.
- Sezgin, Fuat, *Geschichte des arabischen Schrifttums*, Band III: Medizin-Pharmazie-Zoologie-Tierheilkunde bis ca. 430 H., Leiden: E.J. Brill, 1970.
- Sezgin, Fuat, *Geschichte des arabischen Schrifttums*, 9 volumes, Leiden, 1967-1984.
- Shihabi, al-Mustafa; G.S. Colin; A.K.S. Lambton; Halil İnalçık; Irfan Habib, "Filāḥa," *Encyclopaedia of Islam, New Edition*, vol. II (1965), pp. 899-910.
- Shultz, Warren, "The Circulation of Dirhams in the Bahri period," *The Mamluks in Egyptian and Syrian Politics and Society*, Michael Winter and Amalia Levanoni (Eds.), Leiden-Boston: Brill, 2004, pp. 221-244.
- Silverstein, Adam J., *Postal Systems in the Pre-Modern Islamic World*, Cambridge: Cambridge University Press, 2007.
- Sindawi, Khalid, "The Donkey of the Prophet in Shi'ite Tradition," *Al-Masāq*, vol. XVIII, i (2006), pp. 87-98.
- Siraisi, Nancy G., *Avicenna in Renaissance Italy: The Canon and Medical Teaching in Italian Universities after 1500*, Princeton: Princeton University Press, 1987.
- Sisson, Septimus (revised by James Daniels Grossman), *The Anatomy of the Domestic Animals*, Philadelphia and London: W.B. Saunders company, 1953.
- Smith, Fredrick, *The Early History of Veterinary Literature and its British Development*, London: J.L. Allen, 1976 [vol. I reprinted from *The Journal of Comparative Pathology and Therapeutics*, 1912-1918].
- Smith, G. Rex, *Medieval Muslim Horsemanship: A Fourteenth-Century Arabic Cavalry Manual*, London: The British Library, 1979.
- Smith, G.R. "Rasūlids," *Encyclopaedia of Islam, New Edition*, vol. VIII (1995), pp. 455-457.
- Smithcors G. Fred and Ann Smithcors, *Five Centuries of Veterinary Medicine: A Short- Title Catalog of the Washington State University Veterinary History Collection*, Pullman, WA: Washington State University Press, 1997.
- Smithcors, J.F., *Evolution of the Veterinary Art: A Narrative Account to 1850*, Kansas City, MO: Veterinary Medicine Publishing, 1957.
- Somogyi, Joseph von, "Die Stellung ad-Damīris in der arabischen Literatur," *Wiener Zeitschrift für die Kunde des Morgenlandes*, vol. LVI (1960), pp. 192-206.
- Sonbol, Amira el Azhary, *The Creation of a Medical Profession in Egypt, 1800-1922*, Syracuse NY: Syracuse University Press, 1991.
- Stern, S.M. (ed.), *Documents from Islamic Chanceries*, Oxford: Bruno Cassirer Publishers, 1965.
- Strange Burke, Katherine, "A Note on Archaeological Evidence for Sugar Production in the Middle Islamic Periods in Bilād al-Shām," *Mamlūk Studies Review*, vol. VIII/2 (2004), pp. 109-118.
- "Al-Šuqūr wa-al-Qaṣ, al-Tā'ir wa-al-Riyāḍah wa-al-Tā'rīkh—Mawḍū' Khāṣ," *Majalat al-Fayṣal*, ed. 'Alawī Tāhā al-Šafī, al-Riyādh, I (1389/1978), pp. 91-113.
- Swabe, Joanna, *Animals, Disease and Human Society: Human-Animal Relations and the Rise of Veterinary Medicine*, London and New York: Taylor & Francis Group, 1999.
- Ṭaqūsh, Muḥammad Suhayl, *Tārīkh al-Mamālik fī Miṣr wa-Bilād al-Shām*, Beirut: Dār al-Nafā'is, 1999.
- Talbot, Charles H., "Medicine," *Science in the Middle Ages*, ed. D.C. Lindberg, Chicago: The University of Chicago Press, 1978, pp. 391-428.

- Tellinton Jones, Linda, "Il metodo del TTouch: Trattati e caratteri del muso," *Il Mio Cavallo*, vol. VII (Luglio 2004), anno 15, pp. 30-35.
- The Animals' Lawsuit Against Humanity: A Modern Adaptation of an Ancient Animal Rights Tale*, trans. and adapted by Rabbi Anson Laytner and Rabbi Dan Bridge, Louisville, Kentucky: Fons Vitae, 2005.
- The Art of Falconry By Frederick II of Hohenstaufen*, Translated and edited by Casey A. Wood and F. Marjorie Fyfe, Stanford (California): Stanford University Press, 1961 (1981).
- Tibi, Selma, *The Medicinal Use of Opium in Ninth-Century Baghdad*, Sir Henry Wellcome Asian Series, vol. 5, Leiden-Boston: Brill, 2006.
- Tjerneld, Håkan, *Moamin et Ghatrif: Traités de Fauconnerie et des chiens de chasse*, Stockholm-Paris, 1945. (Thèse pour le Doctorat).
- Τσακνάκης, Τάσος Α., *Ιστορία της Ελληνικής Κτηνιατρικής*, Thessaloniki: University Studio Press, 2002.
- Tsugitaka, Sato, "Sugar in the Economic Life of Mamluk Egypt," *Mamluk Studies Review*, VIII (2), 2004, pp. 87-107.
- Tucci, Giuseppe (ed.), *7000 Anni D'Arte Iranica, Mostra realizzata in collaborazione con l'Istituto Italiano per il Medio e l'Estremo Oriente*, Milano—Palazzo Reale, Maggio-Giugno, 1963.
- Ullmann, Manfred, *Die Medizin im Islam*, Handbuch der Orientalistik, ed. Bertold Spuler, 1 Abt.: Der Nahe und Mittlere Osten, Ergänzungsband VI, 1 Abschnitt, Leiden/Köln: E.J. Brill, 1970.
- Ullmann, Manfred, *Islamic Medicine* (Islamic Surveys II), Edinburgh: Edinburgh University Press, 1978.
- Al-'Umārī, Amāl, "Dirāsah li-ba'd wathā'iq tata'allaq bi-bay' wa-shirā' khayūl min al-'aṣr al-mamlūkī," *Majalat ma'had al-makhtūṭāt al-'arabiyyah*, X/2 (Rajab 1384/nov. 1964), pp. 223-249.
- Vajda, G. "al-Dimyāṭī, 'Abd al-Mu'min b. Khālaf Sharaf al-Dīn al-Tūnī al-Dimyāṭī al-Shāfiī," *Encyclopaedia of Islam, New Edition*, vol. II (1965), pp. 292-293.
- Vazques, C. de Benito, M., "Sobre un manuscrito arabe hallado en Alcazar de Consuegara," *Sharq al-Andalus*, X-XI (1993-94), pp. 711-720.
- Viré, François(†), trans., "L'utilisation du grand corbeau, d'après le traité de chasse d'Al-Asadi," preceded by Baudouin van den Abeele, "Notice bio-bibliographique sur François Viré, et de 'Le Grand Corbeau, oiseau de vol dans l'Islam medieval,'" *Arabica*, vol. LII/4 (2005), pp. 549-554.
- Viré, François, "À Propos de la chasse au guépard d'après les sources arabes et les oeuvres d'art musulman par Ahmad Abd Ar-Raziq," *Arabica*, vol. XXI (1974), pp. 84-88.
- Viré, François, "À propos des chiens de chasse *salūqī* et *zāgārī*," *Revue des Études Islamiques*, vol. XLI (1973), pp. 231-240.
- Viré, François, "Bayzara," *Encyclopaedia of Islam, New Edition*, vol. I (1960), pp. 1152-1155.
- Viré, François, "Essai de détermination des oiseaux-de-vol mentionnés dans les principaux manuscrits arabes médiévaux sur la fauconnerie," *Arabica*, vol. XXIV, fasc. 2 (1977), pp. 138-149.
- Viré, François, "Fahd," *Encyclopaedia of Islam, New Edition*, vol. II (1965), pp. 738-743.
- Viré, François, "Kalb," *Encyclopaedia of Islam, New Edition*, vol. IV (1978), pp. 489-492.
- Viré, François, "La Fauconnerie dans l'Islam Médiéval (d'après les manuscrits arabes, du VIIIème au XIVème siècle)," *La Chasse au Moyen Age. Actes du Colloque de Nice*, Paris-Nice: Les Belles Lettres, 1980, pp. 189-197.
- Viré, François, "Ṣayd," *Encyclopaedia of Islam, New Edition*, vol. IX (1997), pp. 98-99.
- Viré, François, "Sur L'identité de Moamin le Fauconnier," *Comptes-Rendus de l'Académie des Inscriptions et Belles-Lettres*, Paris, 1967.
- Viré, François, *Le traité de l'art de volerie (Kitab al-bayzara), rédigé vers 385/955 par le Grand-Fouconnier du calife fatimide al-'Aziz bi-llah*, *Arabica*, Tome XII (1966), pp. 1-296 et Tome XIII (1966), pp. 39-84.

- Wafai, M. Zafer (ed.), *The Arabian Ophthalmologists*, Compiled from Original Texts by J. Hirschberg, J. Lippert and E. Mittwoch, translated into English by Frederick C. Blodi, Wilfried J. Rademaker, Gisela Rademaker, and Kenneth F. Wildman. Riyadh: King Abdulaziz City for Science and Technology, 1993.
- Waines, D. "Sukkar," *Encyclopaedia of Islam, Second Edition*, vol. IX (1997), pp. 804-805.
- Walker, R. E., "Roman Veterinary Medicine," in J.M.C. Toynbee, *Animals in Roman Life and Art*, London and Ithaca, NY: Cornell University Press, 1973.
- Walker, R. E., *Ars Veterinaria—The Veterinary art from Antiquity to the End of the 19th Century*, 2nd ed., Kenilworth New Jersey: Sharing-Plough Animal Health, 1991.
- Wansbrough, John, "A Mamluk Commercial Treaty concluded with the Republic of Florence 894/1489," *Documents from Islamic Chanceries*, ed. S. M. Stern, Oriental Studies III, Oxford, 1965, pp. 39-79.
- Watson, Andrew M., *Agricultural Innovation in the Early Islamic World: The Diffusion of Crops and Farming Techniques, 700-1100*, Cambridge: Cambridge University Press, 1983.
- Watson, J., "A Lexicon of Cairene Horse Terminology," *Journal of Semitic Studies*, XXXVII (1992), pp. 247-303.
- Watson, Janet C.E., *Lexicon of Arab Horse Terminology*, London and New York: Kegan Paul International, 1996.
- Wehr, Hans, *A Dictionary of Modern Written Arabic: Arabic-English*, ed. J. Milton Cowan, Beirut and London: Librairie du Liban and MacDonald & Evans Ltd., Third Printing, 1980.
- Weidenhöfer, Veronica, Martin Heide and Joris Peters, "Zur Frage der Kontinuität des hippiatrischen Erbes der Antike: Die Behandlung von Erkrankungen des Bewegungsapparates im *Kitāb al-furūsiya wa-l-baytara* von Muḥammad ibn Ya'qūb ibn aḥī Ḥizām al-Ḥuttulī," *Sudhoffs Archiv*, vol. LXXXIX (2005), pp. 58-95.
- Weitzmann, Kurt, "The Greek Sources of Islamic Scientific Illustrations," *Archaeologica Orientalia in memoriam Ernst Herzfeld*, George C. Miles, et al. eds., Locust Valley NY: J.J. Augustin, 1952, pp. 244-266.
- Wiedemann, Eilhard, "Beziehungen zwischen Tier und Mensch," *Collectanea VI/2: Aufsätze zur Arabischen Wissenschaftsgeschichte*, Georg Olms Verlag, Hildesheim-New York, 1970, pp. 367-371.
- Wiedemann, Eilhard, "Über das Färben der Tiere und Menschen nach al Gaubarī," *Mitteilungen zur Geschichte der Medizin und der Naturwissenschaften*, vol. XVIII (1919), pp. 476-480.
- Wilkinson, Lise, *Animals and Disease: An Introduction to the History of Comparative Medicine*, Cambridge: Cambridge University Press, 1992.
- Williams, John Alden, "Urbanization and Monument Construction in Mamluk Cairo" *Muqarnas*, vol. II (1984), pp. 33-45.
- Winter, Michael and Amalia Levanoni (eds.), *The Mamluks in Egyptian and Syrian Politics and Society*, Leiden-Boston: Brill, 2004.
- Young, M. J. L., J. D. Latham and R. B. Sergeant (eds.), *Religion, Learning and Science in the Abbasid Period*, Cambridge: Cambridge University Press, 1990.
- Zetterstéen, K.V., *Beiträge zur Geschichte der Mamlükensultane*, Leiden: E.J. Brill, 1919.
- Zoppoth, Gerhard, Muḥammad Ibn Māngli, Ein ägyptischer Offizier und Schriftsteller des 14. Jahrhunderts," *Wiener Zeitschrift für die Kunde des Morgenlandes*, 53 (1957), pp. 288-299.

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PLATES



1. *Furūṣīyah* exercises (the *dabbūs* game). Ibn Akhī Ḥizām (?), *Kitāb al-Furūṣīyah wa-al-khayl*, Bibliothèque nationale de France, Paris, Ms. Arabe 2824, fol. 64r° (Egypt, 1470).



2. *Furūṣiyyah* exercises. Muḥammad b. al-Aqṣarāʾi, *Nihāyat al-Suʾl wa-al-Ummūyah fī ʿIlm al-Furūṣiyyah*, The British Library, London, Ms. Add. 18866, fols. 137r^o, 129v^o (Egypt or Syria, 1371).

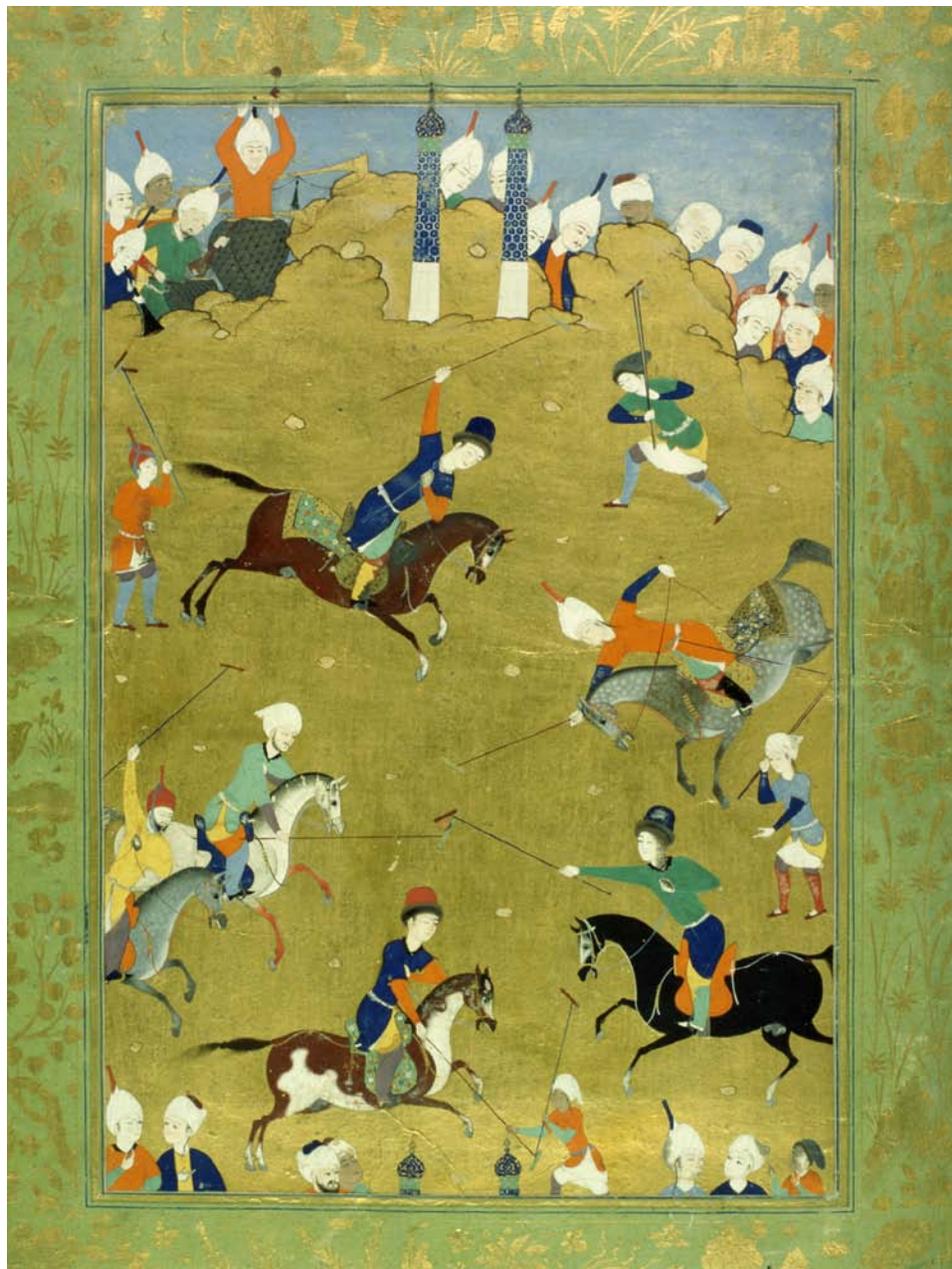


a



b

3 (a-b). *Furusiyyah* exercises (the *qabaq* and *kazlak* games). a. The *qabaq* game. Ibn Akhi Hizām (?), *Kitāb al-Furusiyyah wa-al-khayl*, Bibliothèque nationale de France, Paris, Ms. Arabe 2824, fol. 28r° (Egypt, 1470); b. The *kazlak* game. The Keir Collection, London, cat. 33 (Egypt, 15th century ?).



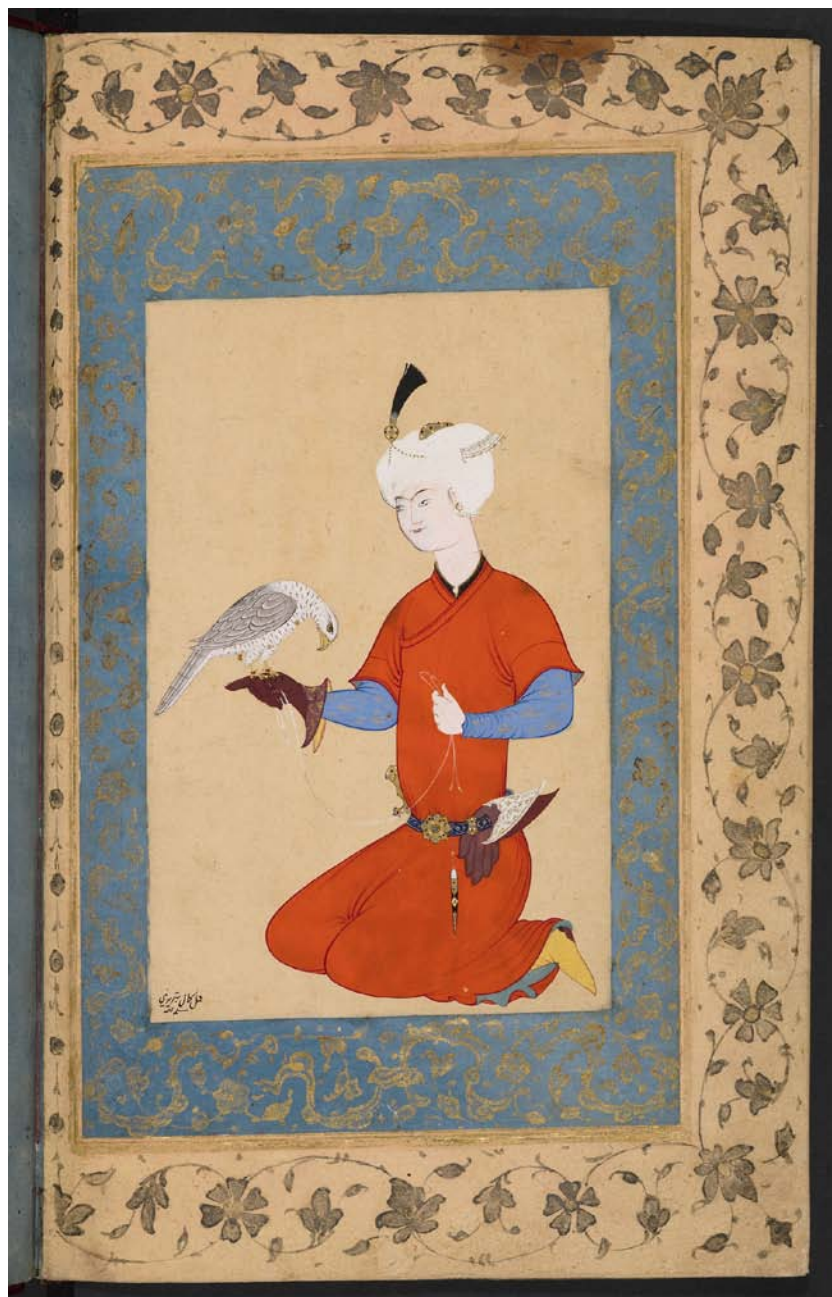
4. The polo game. Album Sarāy, Tebriz, Topkapı Palace Museum Library, Istanbul, Hazine 2161, fol. 3v° (mid-16th century).



5. Pilgrim caravan (*maḥmil*). Assemblies of al-Ḥarīrī (*Maqāmāt al-Ḥarīrī*), Thirty-first *Maqāmah*, Painted by Yahyā b. Maḥmūd al-Wāsiṭī, Bibliothèque nationale de France, Paris, Ms. Arabe 5847 (Schefer Ḥarīrī), fol. 94v° (Baghdad, 1237).



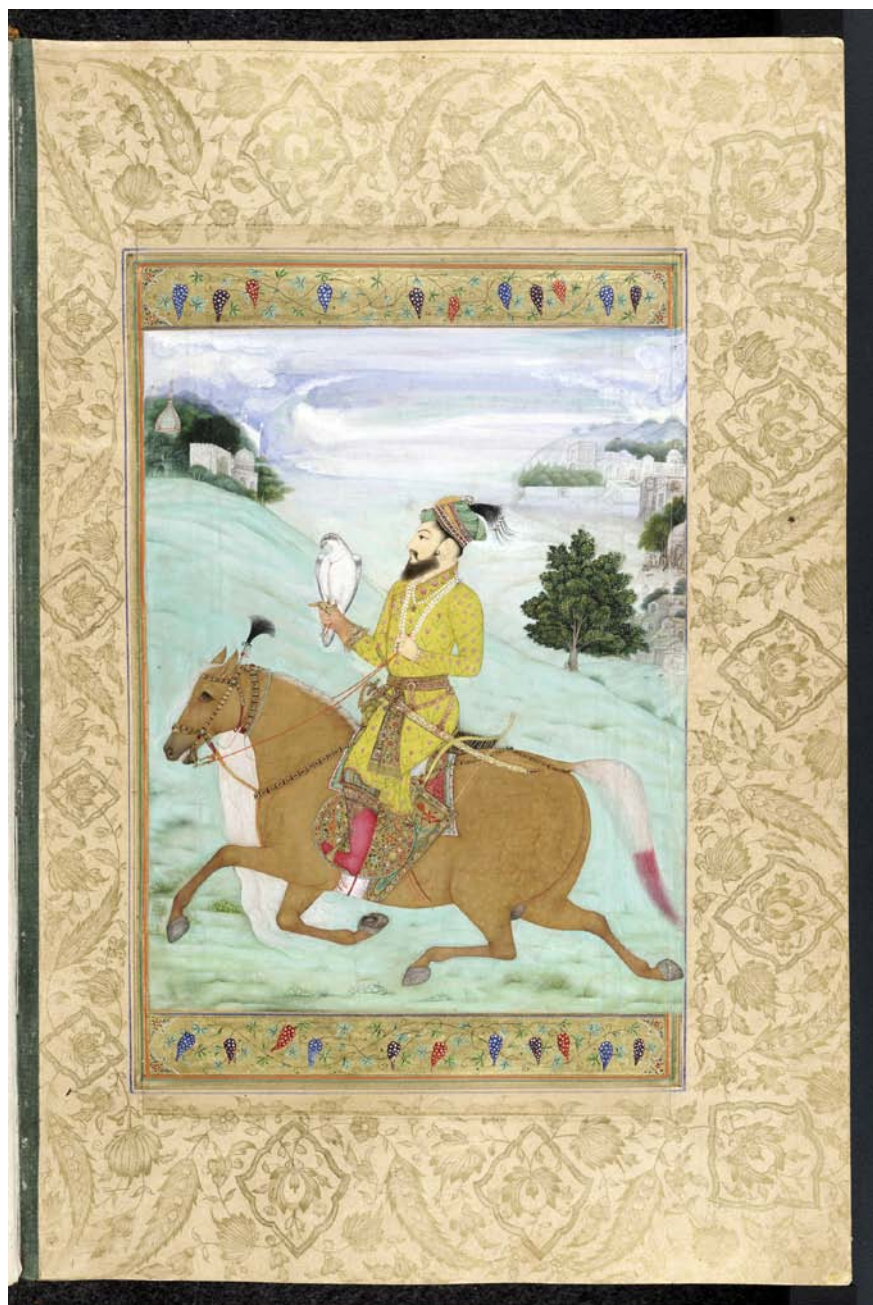
6. Mounted Falconer. Topkapı Palace Museum Library, Istanbul, H.2153, fol. 6v° (c. 1478-90).



7. A Falconer holding a falcon. A painting by Kamāl Tabrīzī, Bodleian Libraries, University of Oxford, Ms. Canon. Or. 122, fol. 60v° (Tabriz, c. 1575).



8. Procession of the Falconers. Siyah Kalem school, Topkapı Palace Museum Library, Istanbul, Hazine 2160, folio 84r° (Herat?, late 15th century).



9. Hunting bird (falcon). *Album of Indian paintings and calligraphy*, Bodleian Libraries, University of Oxford, MS. Douce Or. b.1, fol. 3v^o (India, 16th-17th centuries).



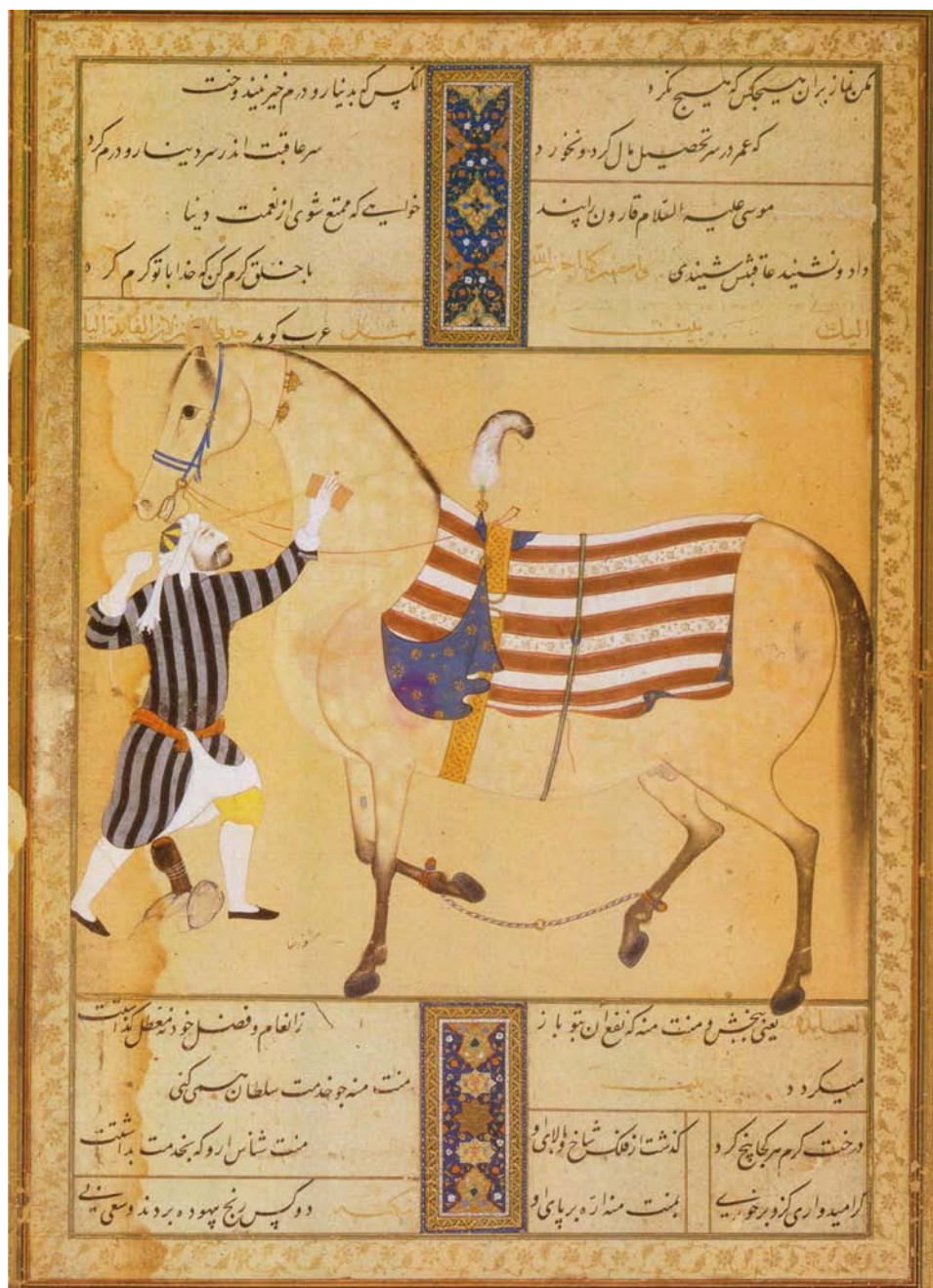
10. Shahjahan hunting with falcon. Bodleian Libraries, University of Oxford, Ms. Douce Or. a.1, fol. 53v° (India, 17th century).



11. Suleyman I, the Magnificent, in a hunting party (detail). Lokman's *Hunername* 'The Book of accomplishments' vol. II, Topkapı Palace Museum Library, Istanbul, H. 1524, fol. 52v° (1588).



12. 'A Royal Hunting Scene', attributed to Bihzad (detail). *Hasht Bihisht* of Amir Khosrow Dihlavi, Topkapı Palace Museum Library, Istanbul, H.676, frontispiece, fol. 2r° (1496).



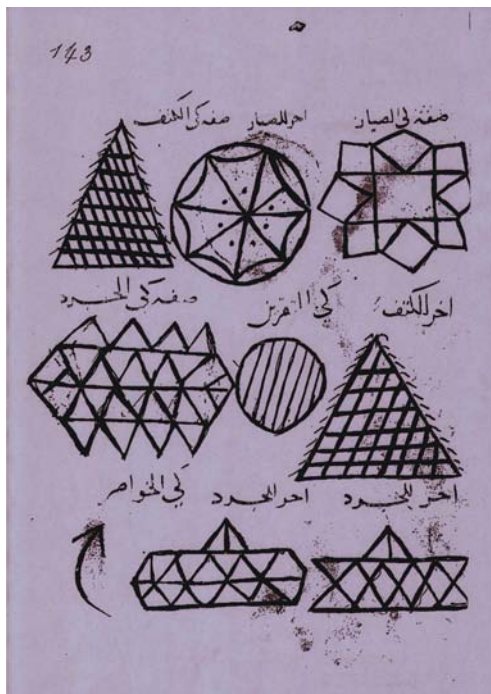
13. An ostler grooming a horse. Iran (Qazvin), by Riḍā, The British Museum, London, Bequest of Sir Bernard Eckstein, 1948. 12-11.014 (c. 1590-1595).



14. Horse's teeth examination. *Kitāb fī al-ṭiḥāyah bi-al-Khayl wa-Sā'ir Dawāb al-Rukūb*, Morocco, La Bibliothèque Royale Hassaniya, Rabat, Ms. 6126, fols. 6v^o-7r^o (1714).



a



b

15 (a-b). Patterns of burns in veterinary practice. Al-Bayṭār, Abū Bakr b. Badr al-Dīn, *Kāshif hamm al-wayl fī ma'rifat amrāḍ al-khayl*, Egypt, Bibliothèque nationale de France, Paris, Ms. Arabe 2813 (Suppl. ar. no. 994), fols. 142v^o-143r^o (1471).



16. A doctor cauterizing leprosy lesions. An illustration from '*Chirurgia imperial*' (Imperial surgery), translated into Turkish from a treatise compiled in Persia, Bibliothèque nationale de France, Paris, Ms. suppl. turc 693 (13th century).



17. Taming a horse. Aḥmad b. al-Ḥasan b. al-Aḥnaf, *Kitāb al-Bayṭarah*, The National Library and Archives of Egypt (*Dār al-Kutub*), Cairo, Ms. Ṭibb Khalil Āghā 8, Microfilm 46631, fol. 91^o (1209).



18. An emaciated ox (zebu) treated with liquorice root. Aḥmad b. al-Ḥasan b. al-Aḥnaf, *Kitāb al-Bayṭarah*, The National Library and Archives of Egypt (*Dār al-Kutub*), Ms. Ṭibb Khalil Āghā 8, Microfilm 46631 (1209).



←

19. Treating a camel's skin disease. Aḥmad b. al-Ḥasan b. al-Aḥnaf, *Kitāb al-Bayṭarah*, The National Library and Archives of Egypt (*Dār al-Kutub*), Ms. Ṭibb Khalil Āghā 8, Microfilm 46631, fols. 287^o (1209).



20. Shoeing a horse. Manuscript from Mogul India, British Museum, London, 1942 1-24 01 (India, c. 1595).

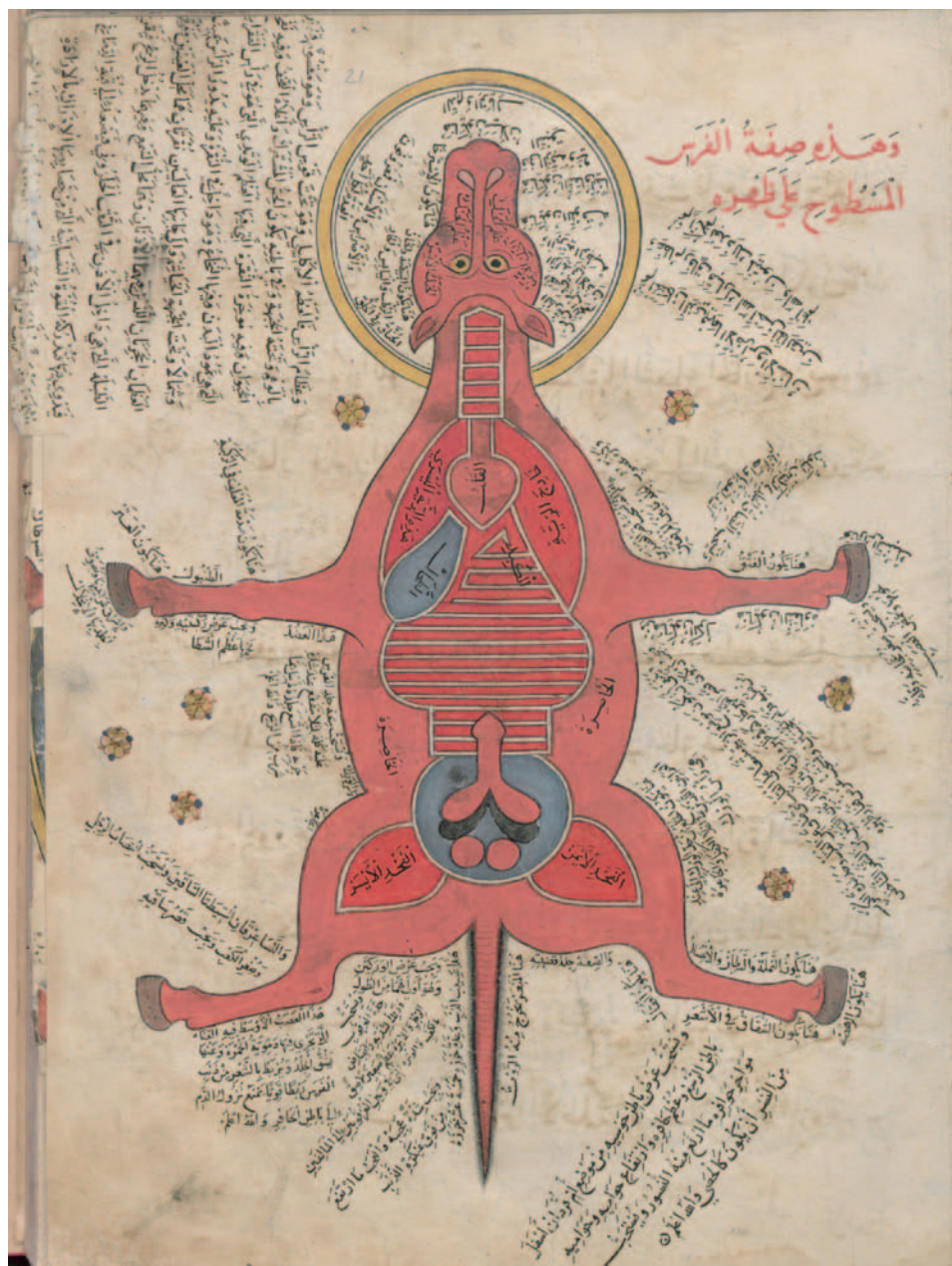


21. Shadow-theatre figures of a riding falconer holding a falcon or hawk. Museum für Islamische Kunst, Berlin, I. 1642 (Egypt, 14th–15th century).



23. Arabic Noble Horse. Zakariyā Muḥammad al-Qazwīnī, *ʿAjā'ib al-Makhlūqāt* (The Marvels of the Creation), Institute of Oriental Manuscripts of the Russian Academy of Sciences, St. Petersburg, cat. 178 (Iran, 988/1580).

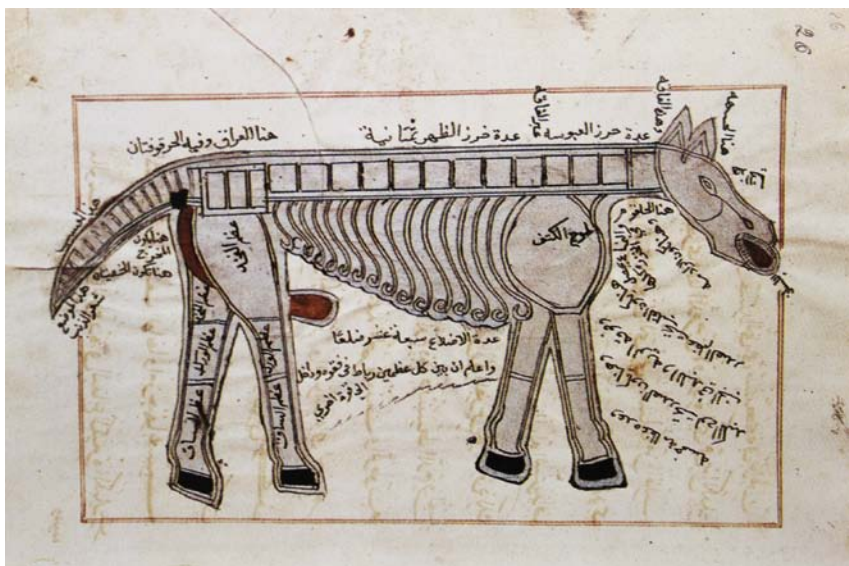
← 22. Favourite colours of noble Arabic horses. Illustrations from *Kitāb al-zardāqah fī ma'rifat al-khayl wa-ajnasihā wa-amrādhā wa-adwiyatihā*, Furusiya Art Foundation (18th century).



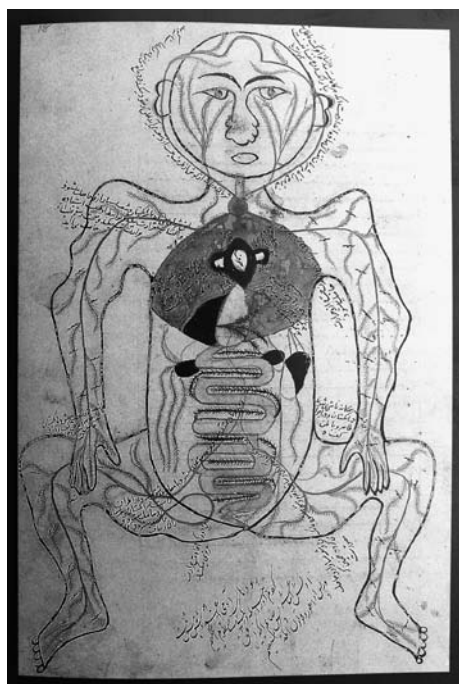
24. Anatomy of the horse. *Kitāb al-Baytarah*, Library of Istanbul University, Istanbul, Inv. AY4689, fol. 41r^o (15th century).



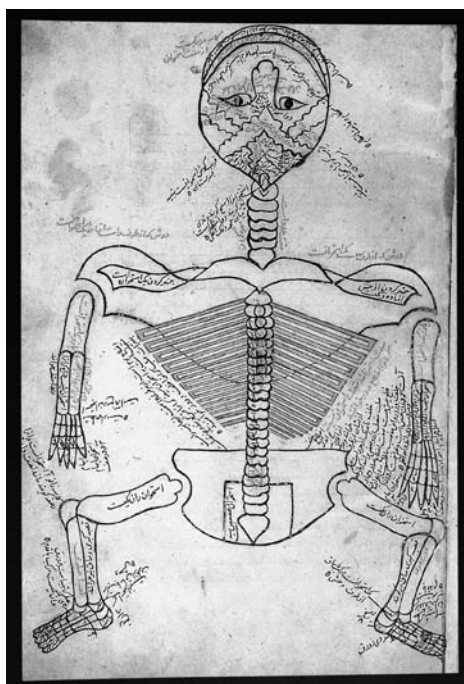
25. Anatomy of the horse. *Kitāb al-zardaqaḥ fī ma'rifat al-khayl wa-ajnasihā wa-amrāḍihā wa-adwiyatihā*, Shah Brothers, London (18th century).



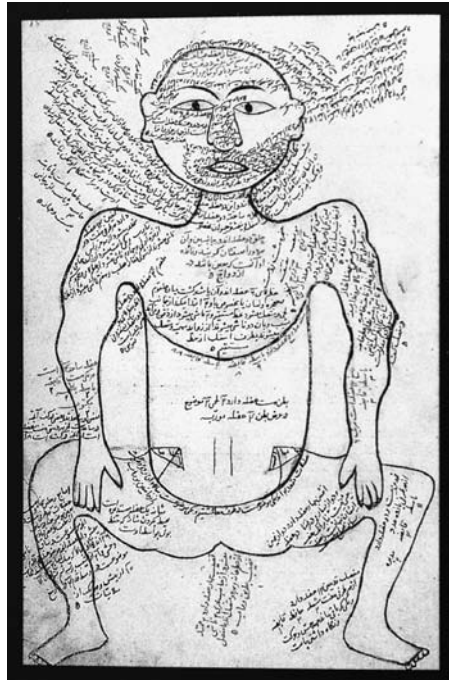
26. Skeleton of the horse. Wahab b. Munabbih, *Kitāb fī 'ilm siyāsāt al-khayl*, Bibliothèque nationale de France, Paris, Ms. Arabe 2817 (Suppl. ar. n. 993), fol. 26r^o (1767).



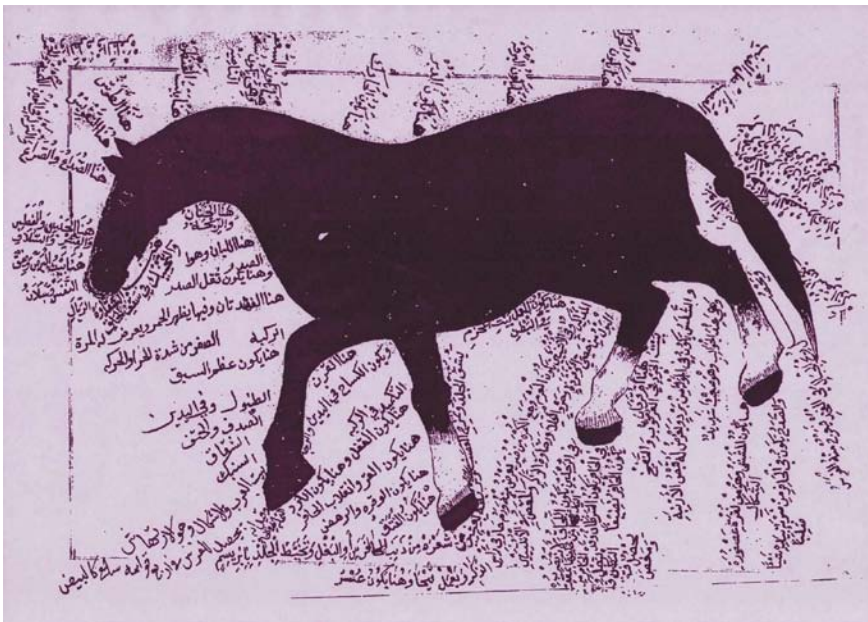
27. Digestive and arterial system of the human body. Maṣṣūr ibn Muḥammad ibn Aḥmad ibn Yūsuf Ibn Ilyās (fl. c. 1390), *Tashrīḥ-i badan-i insān* (The Anatomy of the Human Body), National Library of Medicine, Bethesda, MD, Ms. P 19, fol. 18r^o (c. 15th or early 16th century).



28. The skeletal system of the human body. Maṣṣūr ibn Muḥammad ibn Aḥmad ibn Yūsuf Ibn Ilyās (fl. c. 1390), *Tashrīḥ-i badan-i insān* (The Anatomy of the Human Body), National Library of Medicine, Bethesda, MD, Ms. P 19, fol. 8r^o (c. 15th or early 16th century).



29. Muscular system. Manṣūr ibn Muḥammad ibn Aḥmad ibn Yūsuf Ibn Ilyās (fl. c. 1390), *Tashrīḥ-i badan-i insān* (The Anatomy of the Human Body), National Library of Medicine, Bethesda, MD, Ms. P 19, fol. 13r^o (c. 15th or early 16th century).



30. Depiction of the horse's organs accompanied by the names of illnesses affecting them. Wahab b. Munabbih, *Kitāb fī 'Ilm Siyāsāt al-Khayl*, Bibliothèque nationale de France, Paris, Ms. Arabe 2817 (Suppl. ar. no. 993), fol. 14v^o (1767).



31. Depiction of the horse's organs accompanied by the names of illnesses affecting them. Wahab b. Munabbih, *Kitāb fī 'Ilm Siyāsāt al-Khayl*, Bibliothèque nationale de France, Paris, Ms. Arabe 2817 (Suppl. ar. n. 993), fol. 25v^o (1767).



33. Anatomy of the human eye. Al-Mutadibih (active c. 1170-1199), *Tashrīh al-ʿayn* (*Anatomy of the Eye*). The National Library and Archives of Egypt (Dār al-Kutub), Cairo (c. 1200).



32. The horse's organs accompanied by the names of illnesses affecting them. *Kitāb al-zardāqah fi ma rifat al-khayl wa-qināshihā wa-amrādihā wa-adwiyatihā*, Shah Brothers, London (18th century).



34. A horse infected by a rabid dog. Wahab b. Munabbih, *Kitāb fī 'ilm Ṣayāsāt al-Khayl*, Bibliothèque nationale de France, Paris, Ms. Arabe 2817 (Suppl. ar. n. 993), fol. 25^r (1767).



35. A horse infected by a rabid dog. *Kitāb al-zardaqah fī ma'rifat al-khayl wa-ajnasihā wa-amrādhā wa-adwiyatihā*, Shah Brothers, London (18th century).



36. Inserting medicine into the mouth of a horse. Al-Šāhib Tāj al-Dīn, *Kitāb al-Bayṭarh*, Sülemaniye Library, İstanbul, Ms. Fatih 3609, fol. 44v° (Egypt, 14th century?).



37. Using a horn for pouring a medicine into the horse's throat. *Kitāb fī al-Ṭiqāyah bi-al-Khaṣl wa-Sā'ir Dawāb al-Rukāb*, La Bibliothèque Royale Hassaniya, Rabat, Ms. 6126, fols. 18v°-19r° (Morocco, 1714).



40. Spreading lotions on the surface of the skin or on external wounds and cuts. Al-Şāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, Sülemaniye Library, Istanbul, Ms. Fatih 3609, fol. 80r° (Egypt, 14th century?).



41. Treating urine retention. Al-Şāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, Sülemaniye Library, Istanbul, Ms. Fatih 3609, fol. 87v° (Egypt, 14th century?).



42. Horse-mating with a veterinarian's intervention. *Kitāb fī al-ʿInāyah bi-al-Khayl wa-Sāʾir Dawāb al-Rukūb*, La Bibliothèque Royale Hassaniya, Rabat, Ms. 6126, fol. 26r° (Morocco, 1714).



43. Treatment uterine prolapse. Al-Šāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, Sülemaniye Library, İstanbul, Ms. Fatih 3609, fol. 92v° (Egypt, 14th century?).



44. Pregnant mare with her foetus and foal. *Kitāb al-zardaqah fī ma'rifat al-khayl wa-ajnasihā wa-amrāḍihā wa-adwiyatihā*, Shah Brothers, London (18th century).



45. Treating infecundity. Al-Šāhib Tāj al-Dīn, *Kitāb al-Bayṭarah*, Sülemaniye Library, Istanbul, Ms. Fatih 3609, fol. 120v^o (Egypt, 14th century?).

١٤٥

يدق ويخل ويخلط بطيخ عتيق فذرا ربعه اطال لو
 بسا فراح وتوجره الدابة ولذا انما وجده في الكتب
 الدية ولما جربه ان تاخذ جزا من كل تر وقفه
 لعا تر يخلط بسول صيان تر توجره الدابة تر تصور علي
 الارض فاني الصوريين بما يها من الحساب فتر الدابة
 عليها يراذن الله بعد

١	٢	٣
٤	٥	٦
٧	٨	٩

١	٢	٣
٤	٥	٦
٧	٨	٩

الاسب المايه واثنين
 في الفنون في الملبس
 ولما الفنون فعلامتها ان منق سراق البطن والعصب الذي
 في البطن يخرج ولا يخرج من الجلد فتتوايه امعاها

رعيه فاعش يد في الدمن واخذها في فرجها
 والبلاذ رعيه عند ادخاله يد في فرجها لكي لا يغير
 بولها فانها يرا ويؤول وينفع من ذلك ان تعالج بقشر
 البصل وينقشر ويجعل منه علي الماثة ومن علاج الدابة
 التي قد قطعت وبها الحصان تاخذ جزا من كل تر
 يدق ويخلط بسول الصيان وتوجره الدابة تر تصور علي
 الارض فانها الصوريان عليها يمشاها وما يها

احد	عشره	اربعه
اربعه	احد	عشره
عشره	اربعه	احد

احد	عشره	اربعه
اربعه	احد	عشره
عشره	اربعه	احد

من الحساب وتر الدابة عليها فانها يرا يراذن الله
 وينفع من الحصان الذي يكون الدابة من طول السفر
 او من الركض تاخذ دقيقتين تعير يعر يجر وتصنع
 منه اما صاعا ويؤخذ لسان الدابة تر يلد ذلك ايضا

46 (a-b). Magic signs and numerology in the veterinary medicine. Al-Šāhib Tāj al-Dīn, Abū ‘Abd Allāh Muḥammad Ibn Muḥammad Ibn ‘Alī (d. 707/1307), *Kitāb al-Bayṭarah*; Süleymaniye Library, Istanbul, Fatih, MS. 3609, fols. 73r^o and 85v^o (Egypt, 14th century?).

ولا يدوق علفا ولا يغيد فيه الرقا وقد ينفع بمن يدهن يده بالزيت ويخرج
دونه بما استطاع وحقيقته بالزيت والسداب ويستفرغه بحفنة فيها خمر
وزيت ونظرون وان ^{قد ان يعلقه في شئ من الاكسية والعي}



47. A horse suffering from colic. *Kitāb al-zardaqaḥ fī ma'rifat al-khayl wa-ajnasihā wa-amrāḍihā wa-adwiyatihā*, Shah Brothers, London (18th century).



48. Treatment of a venereal horse disease. *Kitāb al-Bayṭarah*, Topkapı Palace Museum Library, Istanbul, TSMK A.2115, fol. 156v^o (Baghdad, Seljuk period).